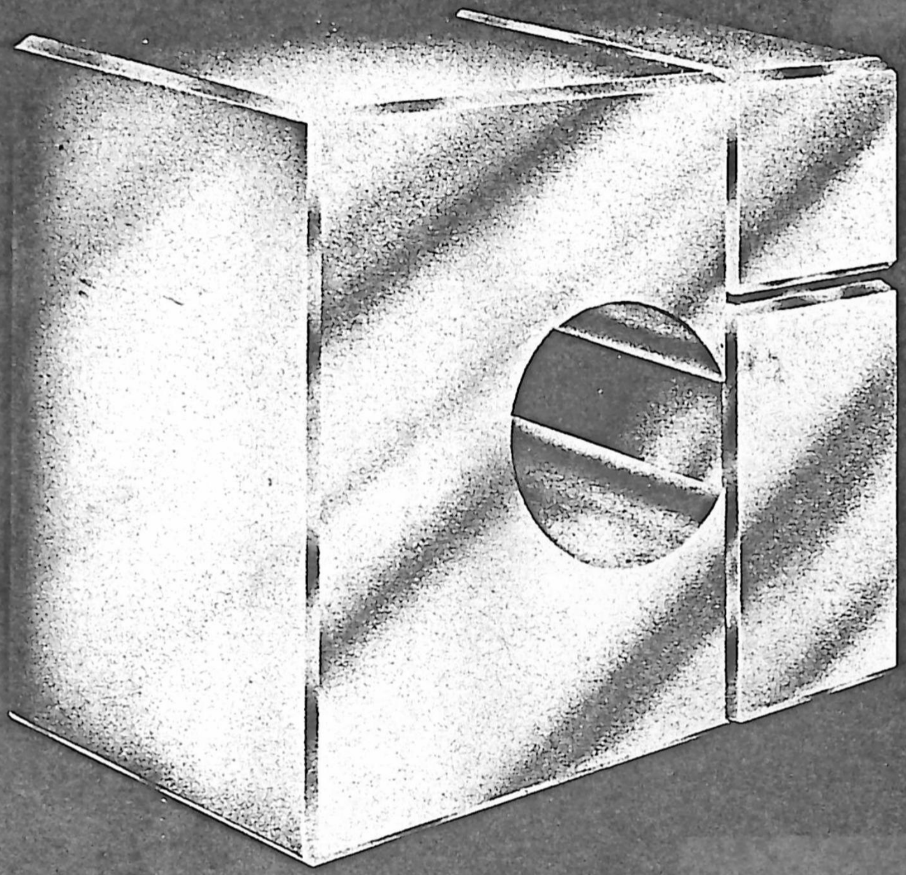
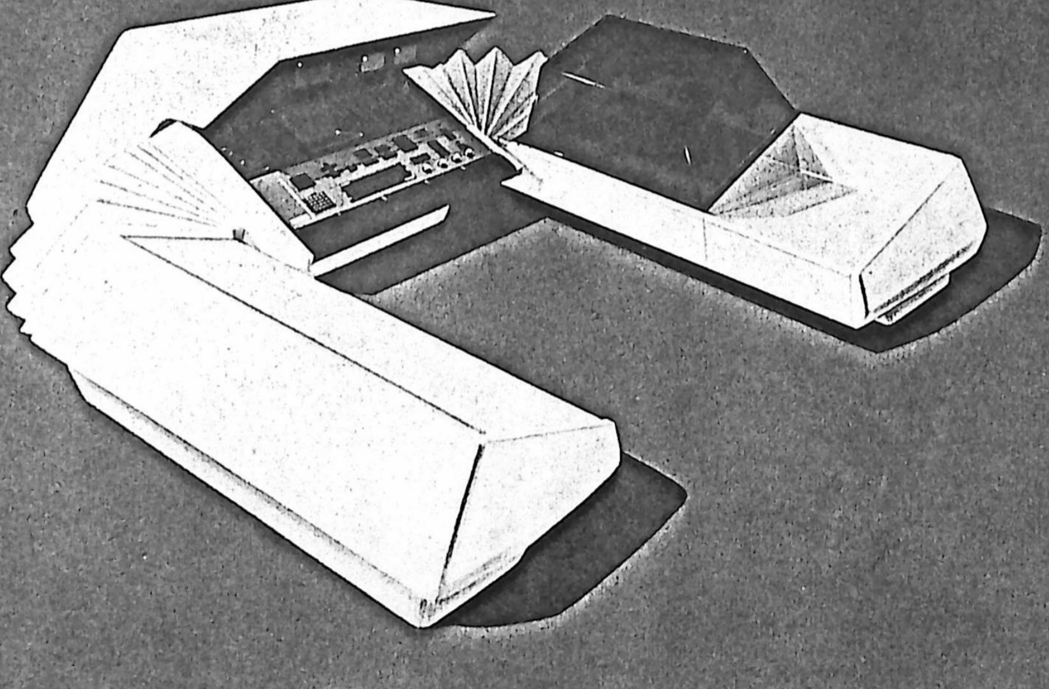
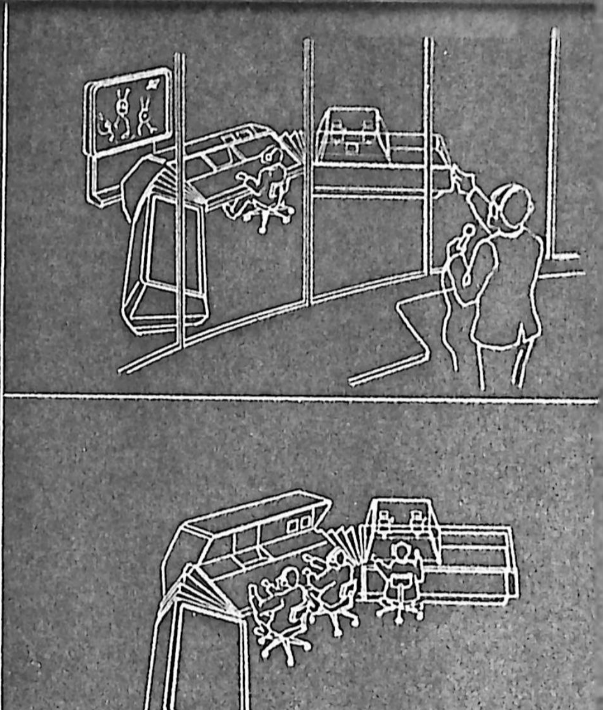
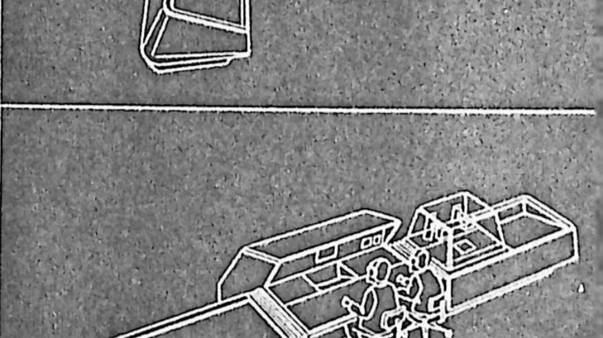
COMPUTER IMAGE
CORPORATION









RTL
productions
S.à r.l.

COMPUTER IMAGE CORPORATION
attention Mr. Ed Tajchman
2475 West Second Avenue / Suite 4
DENVER, COLORADO 80223
U.S.A.

Réf. ST/dth

Luxembourg, le 2.7.1981.

Dear Ed,

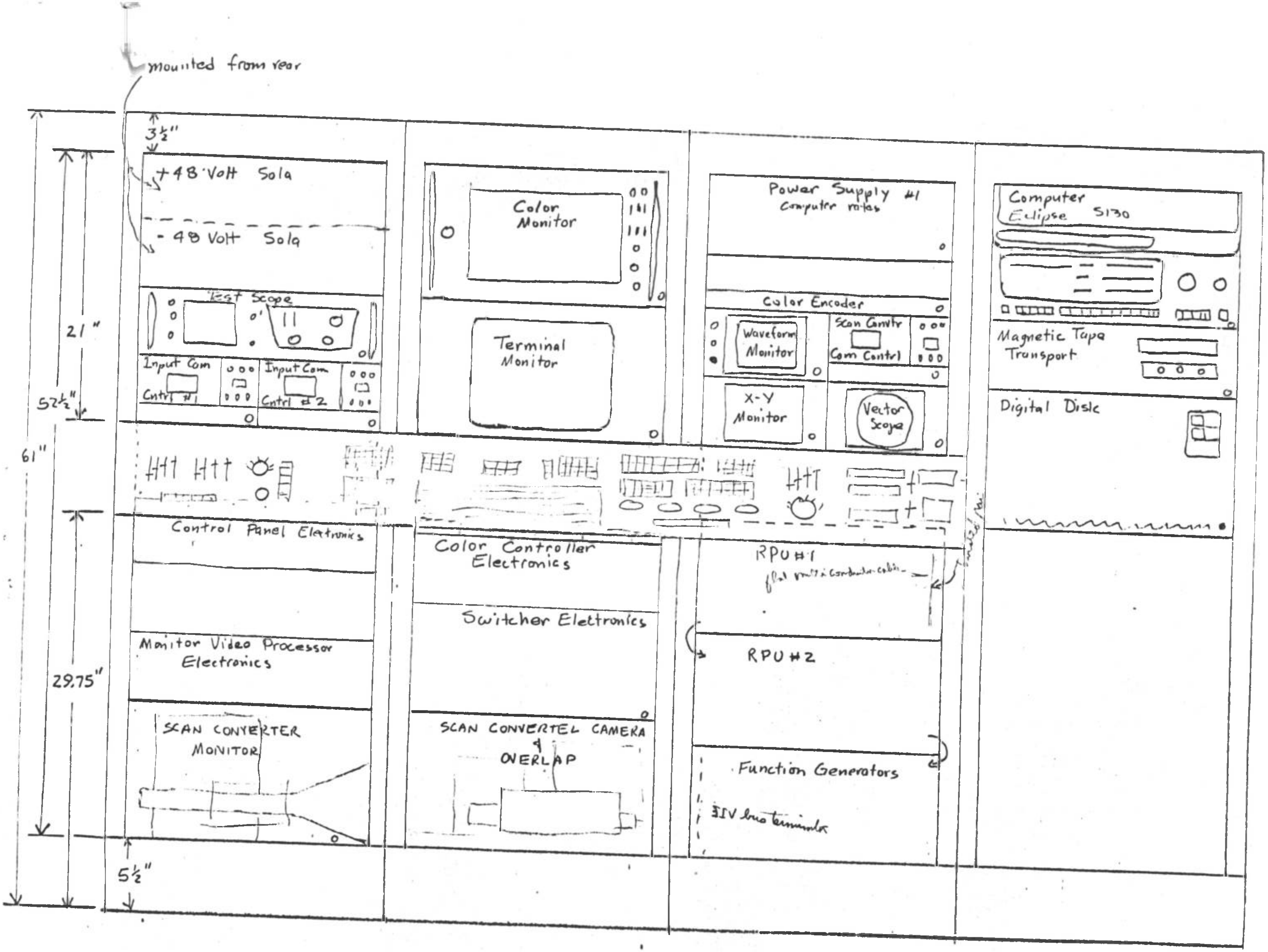
Herewith I confirm you that Robert Demuth will arrive in Denver August 15. However Guy Sandt and myself will arrive August 22 and we'll all leave September 5. We booked the appartements at Brooks Towers.

I look forward to seeing you

Sincerely,

René

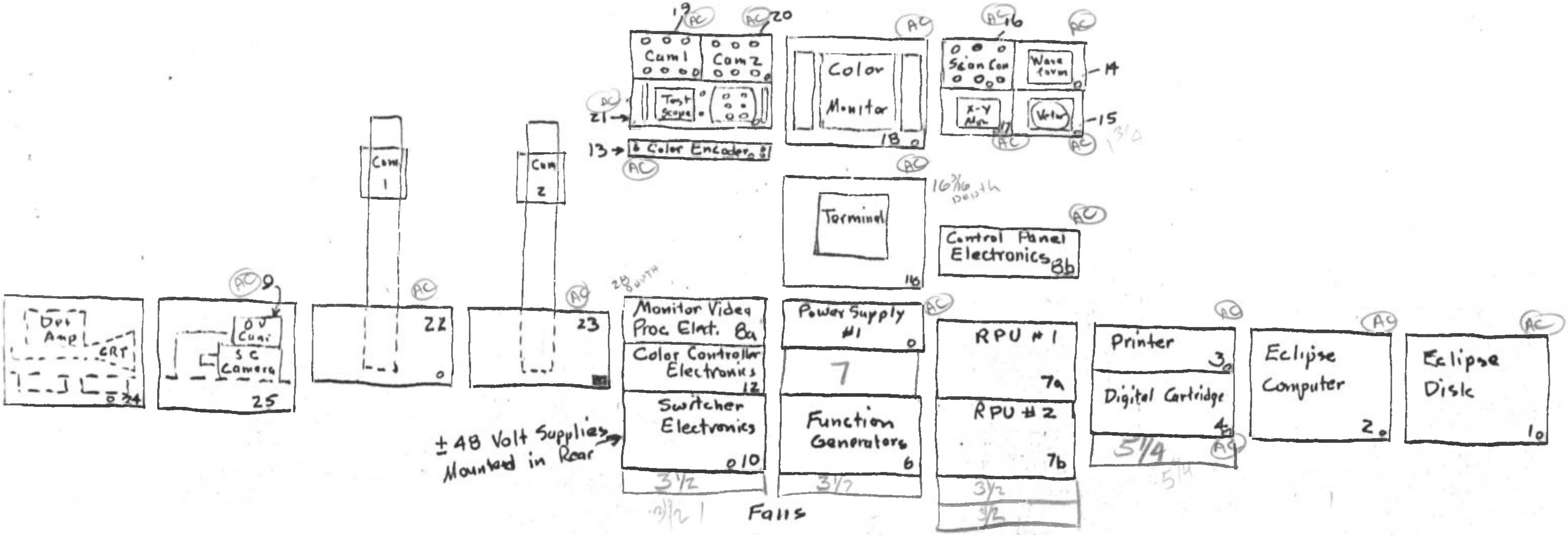
René Steichen
Director



PROTOTYPE SYSTEM IV

10/19/80

19 AC PLUGS



SYSTEM IV Systems Layout

11/19/80

6/15/81 gH

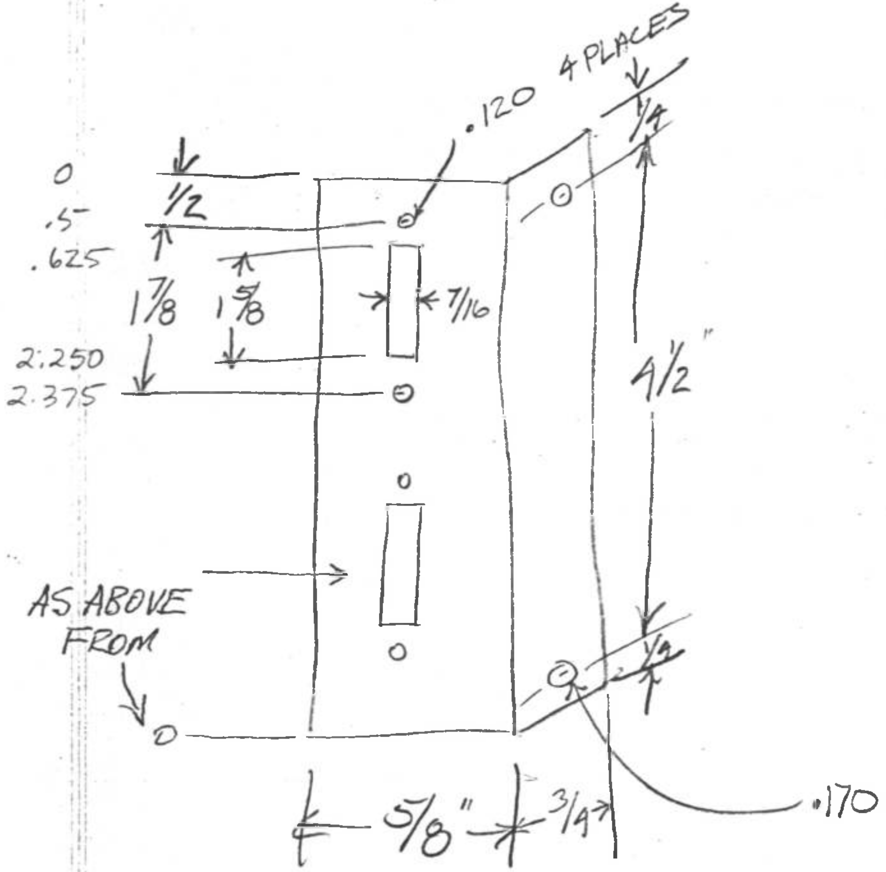
COMPLETE SYS IV METAL PARTS

DWG NO	QTY/SYS	DISCRIPTION
XC-2552	1RT, 1LFT	MAIN CONSOLE "L" BRACKET
C-2643	4	SIDE CONSOLE leg assembly
C-2614	1	PRINTER SUPPORT TRAY
C-2606	4	SIDE CONSOLE BACK HOOD
C-2602A	2	MAIN CONSOLE SUPPORTS
C-2602B	2	MAIN CONSOLE SUPPORTS
C-2603	1	MAIN CONSOLE lower BACK
C-2604	1	MAIN CONSOLE BACK
C-2605	1	MAIN CONSOLE HOOD
C-26A5	4	SIDE CONSOLE LEG SHROUD (2 PIECES)
C	1	BACK HOOD SUPPORT
C	1	CONTROL PANEL FRAME
CI-00358	1	MUP CONTROL PANEL
CI-00359	1	CONTROL/ANIMATE PANEL
CI-00360	1	MSC FUNCTION PANEL
CI-00361	1	SHAFT ENCODER PANEL
CI-00362	1	SWITCHER/COLOR CONTROLLER PANEL
CI-00342	4	FRONT PANELS FOR 5¼" NESTS
CI-00350	3	FRONT PANELS FOR 8¾" NESTS
CI-00323	2	FRONT PANELS FOR SCANCONVERTER
CI-00355	1	FRONT PANEL FOR DATA CASSETTE
CI-00356	1	POWER SUPPLY FOR DATA CASSETTE
CI-00363	1	NEST FOR COMPUTER CRT
CI-00365	2	SWITCH PLATES FOR LIGHT BOXES
CI-00366	2	BEZEL FOR LIGHT BOX COLUMNS
C	2	LIGHT BOX COLUMN MODIFICATION

DWG NO	QTY/SYS	DISCRIPTION
CI-00337	3	REAR PANEL FOR 5¼" NESTS
CI-00341	1	REAR PANEL FOR CONTROL PANEL INTERFACE
CI-00347	1	REAR PANEL FOR FUNCTION GENERATOR
CI-00345	1	REAR PANEL FOR RPU # 1
CI-00346	1	REAR PANEL FOR RPU #2
CI-00348	3	8¾" NESTS REAR PANEL MOUNTING BRACKET
CI-00349	3	8¾" NESTS REAR PANEL HINGE
CI-00311	1	H.R. MON BASEPLATE
CI-00312	1	H.R. MON REAR PANEL
CI-00131	1	FRONT TUBE SUPPORT
CI-00132	2	BRACES FOR FRONT TUBE SUPPORT
CI-00192	1	YOKE RING
CI-00193	4	YOKE RING/FOCUS COIL RING TAB
CI-00194	4	YOKE RING/FOCUS COIL RING SUPPORT
CI-00195	1	YOKE RING SUPPORT BASE
CI-00197	1	FOCUS COIL RING
CI-00200	1	FOCUS COIL RING SUPPORT BASE
CI-00201A	1	CRT REAR TUBE SUPPORT
CI-00314	1	DEFLECTION AMP P.C. BRACKET & CONNECTOR PLATES (3PIECES)
CI-00322	8	SCANCONVERTER FRONT/REAR PANEL SUPPORT BRACK
CI-00317	1	SCANCONVERTER CAMERA DRAWER BASE PLATE
CI-00319	1	SCANCONVERTER CAMERA MOUNT (3 PIECES)
CI-00320	1 RT, 1 LFT	OVERLAP CAMERA CONTROL NEST
CI-00321	1	OVERLAP CAMERA H.V. SUPPLY COVER
CI-00256A	1	1 OF 2 2 OF 2 OVERLAP STROBE HOOD/SIDE PLATE
	1	OVERLAP STROBE HOOD SIDE PLATE 2 PIECES
CI-00251	1	PROBE CLAMP BRACKET
CI-00324	1	SCANCONVERTER ALIGNMENT JIG

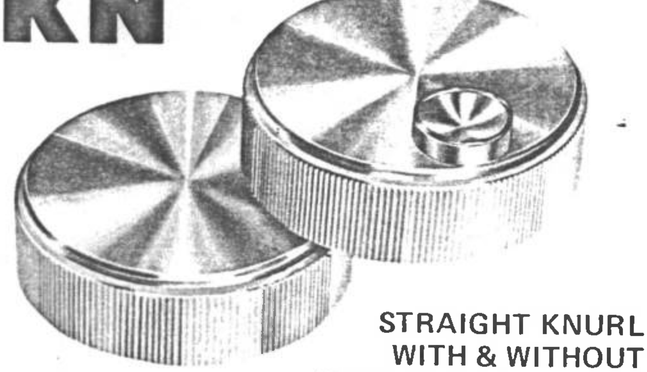
DWG NO	QTY / SYS	DISCRIPTION
CI-00333	1	SOLA POWER SUPPLY NEST
CI-00334	1	SOLA FRONT PANEL MODIFICATON (2 PIECES)
CI-00330	1	MAIN SUPPLY FRONT PANEL
CI-00326	1	MAIN SUPPLY BASE PLATE
CI-00327	1 RT, 1 LFT	MAIN SUPPLY SIDE PANELS
CI-00328	1	MAIN SUPPLY REAR PANEL 4 PIECES
CI-00329	1	MAIN SUPPLY SUPPORTS 7 PIECES
CI-00336	6	5¼" NEST END PLATES
CI-00339	1 RT, 1 LFT	CONTROL PANEL NEST END PLATES
CI-00344	3	8¾" NEST END PLATES MODIFICATION
CI-00340	1	CONTROL PANEL NEST POWER PANEL
CI-00364	1	ECLIPSE CONNECTOR BRACKET
CI-00331	1	MAIN SUPPLY LID
CI-00318	1	SCANCONVERTER CAMERA DRAWER REAR PANEL
CI-00313	1	H.R. MON P.C. CARD GUIDES ASSEM 2 PIECES
CI-00097	1	YOKE FRONT SUPPORT
CI-00098	1	YOKE REAR SUPPORT
CI-00354	3	5¼" BLANK PANELS
CI-00353	3	3½" BLANK PANELS
CI-00352	1	1¾" BLANK PANEL
CI-00315	1	POT MOUNTING BRACKET ASSM.
CI-00351	16	HINGE FOR 5¼ AND 8¾ NESTS FRONT PANEL
CI		

MOUNTS ON Eclipse computer

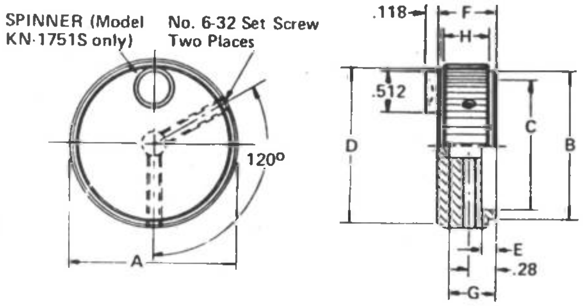


STANDOFF 4-40 STUD HEX STK/W/ 4-40 THD

KN SERIES



STRAIGHT KNURL
WITH & WITHOUT
"FINGERTIP" SPINNER



All models less indicator lines.

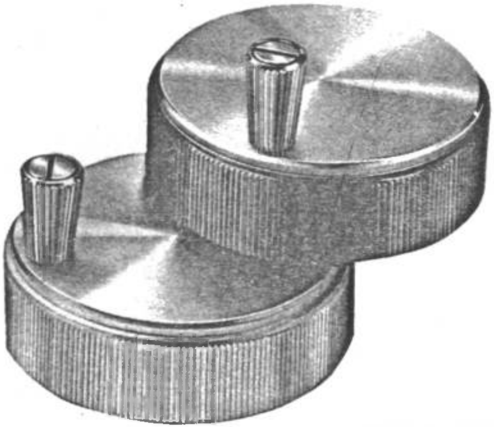
MODEL	COLOR Body—Top/Spin.	PRICE			
		1-99	100-249	250-499	500-999
KN-1751A-1/4	Natural	3.05	2.75	2.59	2.44
KN-1751B-1/4	Black	3.05	2.75	2.59	2.44
KN-1751AB-1/4	Ntl. & Blk.	3.40	3.06	2.89	2.72
KN-1751BA-1/4	Blk. & Ntl.	3.40	3.06	2.89	2.72

SPINNER

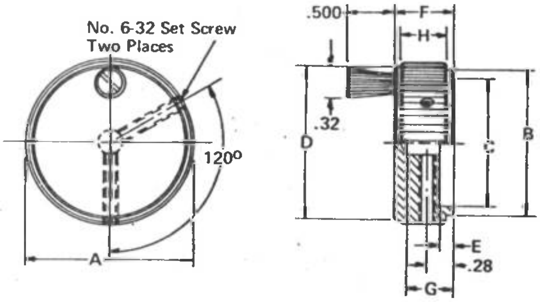
KN-1751AS-1/4	Natural	3.45	3.11	2.93	2.76
KN-1751BS-1/4	Black	3.45	3.11	2.93	2.76
KN-1751ABS-1/4	Ntl. & Blk.	3.70	3.33	3.15	2.96
KN-1751BAS-1/4	Blk. & Ntl.	3.70	3.33	3.15	2.96

Dia.	DIMENSIONS						
A	B	C	D	E	F	G	H
1.750	1.550	1.370	1.650	.160	.625	.507	.480
1.750	1.550	1.370	1.650	.160	.625	.507	.480
1.750	1.550	1.370	1.650	.160	.625	.507	.480
1.750	1.550	1.370	1.650	.160	.625	.507	.480
1.750	1.550	1.370	1.650	.160	.625	.507	.480
1.750	1.550	1.370	1.650	.160	.625	.507	.480
1.750	1.550	1.370	1.650	.160	.625	.507	.480
1.750	1.550	1.370	1.650	.160	.625	.507	.480

KN SERIES



STRAIGHT KNURL
WITH
"CRANK" SPINNER

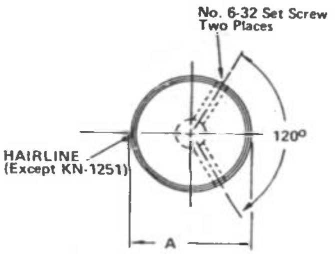


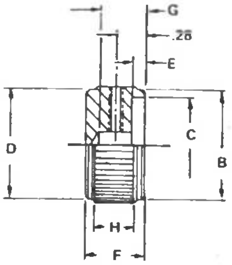
All models less indicator lines.

MODEL	COLOR Body—Top/Spin	PRICE			
		1-99	100-249	250-499	500-999
KN-1755AS-1/4	Natural	3.95	3.56	3.36	3.16
KN-1755BS-1/4	Black	3.95	3.56	3.36	3.16
KN-1755ABS-1/4	Ntl. & Blk.	4.30	3.87	3.66	3.44
KN-1755BAS-1/4	Blk. & Ntl.	4.30	3.87	3.66	3.44

Dia.	DIMENSIONS						
A	B	C	D	E	F	G	H
1.750	1.550	1.370	1.650	.160	.625	.507	.480
1.750	1.550	1.370	1.650	.160	.625	.507	.480
1.750	1.550	1.370	1.650	.160	.625	.507	.480
1.750	1.550	1.370	1.650	.160	.625	.507	.480

Prices and design subject to change without notice.





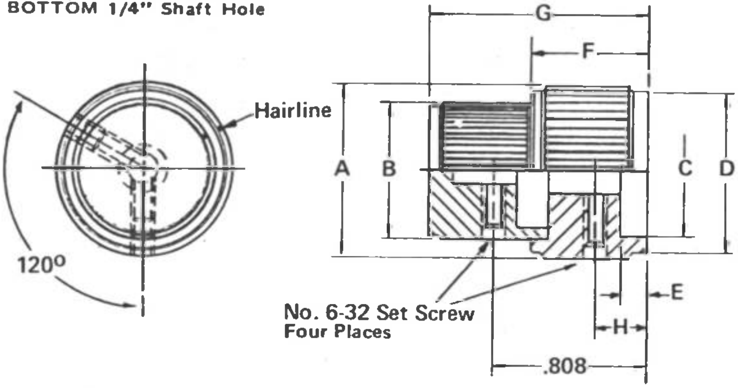
KN SERIES

STRAIGHT KNURL
WITH & WITHOUT
INDICATOR LINE

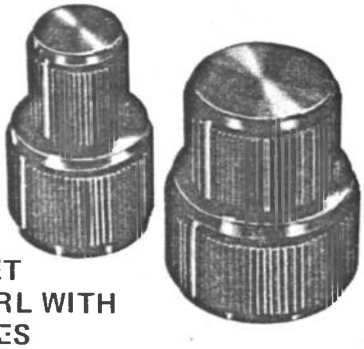
MODEL	COLOR Body — Top	PRICE 1-99	100-249	250-499	500-999
KN-500A-1/8	Natural	1.05	.95	.89	.84
KN-500A-1/4	Natural	1.05	.95	.89	.84
KN-500B-1/8	Black	1.05	.95	.89	.84
KN-500B-1/4	Black	1.05	.95	.89	.84
KN-700A-1/4	Natural	1.20	1.08	1.02	.96
KN-700B-1/4	Black	1.20	1.08	1.02	.96
KN-900A-1/4	Natural	1.35	1.22	1.15	1.08
KN-900B-1/4	Black	1.35	1.22	1.15	1.08
KN-1250A-1/4	Natural	1.95	1.76	1.66	1.56
KN-1250B-1/4	Black	1.95	1.76	1.66	1.56
TWO TONED					
KN-500AB-1/8	Ntl. & Blk.	1.30	1.17	1.11	1.04
KN-500AB-1/4	Ntl. & Blk.	1.30	1.17	1.11	1.04
KN-500BA-1/8	Blk. & Ntl.	1.30	1.17	1.11	1.04
KN-500BA-1/4	Blk. & Ntl.	1.30	1.17	1.11	1.04
KN-700AB-1/4	Ntl. & Blk.	1.45	1.31	1.23	1.16
KN-700BA-1/4	Blk. & Ntl.	1.45	1.31	1.23	1.16
KN-900AB-1/4	Ntl. & Blk.	1.60	1.44	1.36	1.28
KN-900BA-1/4	Blk. & Ntl.	1.60	1.44	1.36	1.28
KN-1250AB-1/4	Ntl. & Blk.	2.25	2.03	1.91	1.80
KN-1250BA-1/4	Blk. & Ntl.	2.25	2.03	1.91	1.80
LESS INDICATOR					
KN-1251A-1/4	Natural	1.90	1.71	1.62	1.52
KN-1251B-1/4	Black	1.90	1.71	1.62	1.52

Dia. A	DIMENSIONS B	C	D	E	F	G	H
.500	.445	.374	.445	.157	.625	.512	.456
.500	.445	.374	.445	.157	.625	.512	.456
.500	.445	.374	.445	.157	.625	.512	.456
.500	.445	.374	.445	.157	.625	.512	.456
.750	.695	.590	.695	.157	.625	.512	.456
.750	.695	.590	.695	.157	.625	.512	.456
.937	.882	.708	.882	.157	.625	.512	.456
.937	.882	.708	.882	.157	.625	.512	.456
1.250	1.195	.984	1.195	.157	.625	.512	.456
1.250	1.195	.984	1.195	.157	.625	.512	.456
.500	.445	.374	.445	.157	.625	.512	.456
.500	.445	.374	.445	.157	.625	.512	.456
.500	.445	.374	.445	.157	.625	.512	.456
.500	.445	.374	.445	.157	.625	.512	.456
.750	.695	.590	.695	.157	.625	.512	.456
.750	.695	.590	.695	.157	.625	.512	.456
.937	.882	.708	.882	.157	.625	.512	.456
.937	.882	.708	.882	.157	.625	.512	.456
1.250	1.195	.984	1.195	.157	.625	.512	.456
1.250	1.195	.984	1.195	.157	.625	.512	.456
1.250	1.195	.984	1.195	.157	.625	.512	.456
1.250	1.195	.984	1.195	.157	.625	.512	.456

TOP 1/8" Shaft Hole
BOTTOM 1/4" Shaft Hole



KN SERIES



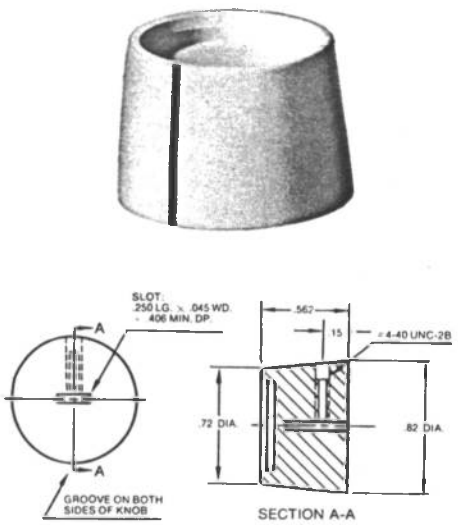
CONCENTRIC SET
STRAIGHT KNURL WITH
INDICATOR LINES

MODEL	COLOR	PRICE 1-99	100-249	250-499	500-999
KN-5700A (Pr.)	Natural	2.30	2.07	1.96	1.84
KN-5700B (Pr.)	Black	2.30	2.07	1.96	1.84
KN-7900A (Pr.)	Natural	2.60	2.34	2.21	2.08
KN-7900B (Pr.)	Black	2.60	2.34	2.21	2.08

Dia. A	DIMENSIONS B	C	D	E	F	G	H
.750	.500	.571	.695	.157	.625	1.151	.281
.750	.500	.571	.695	.157	.625	1.151	.281
.937	.750	.708	.882	.157	.625	1.151	.281
.937	.750	.708	.882	.157	.625	1.151	.281

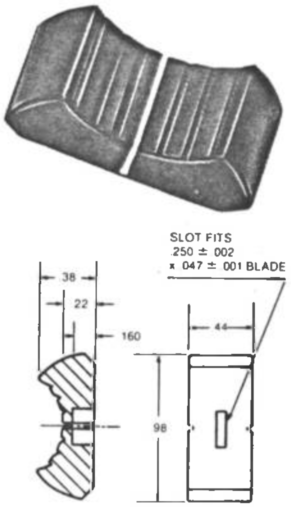
Custom Knobs & Escutcheons

Round



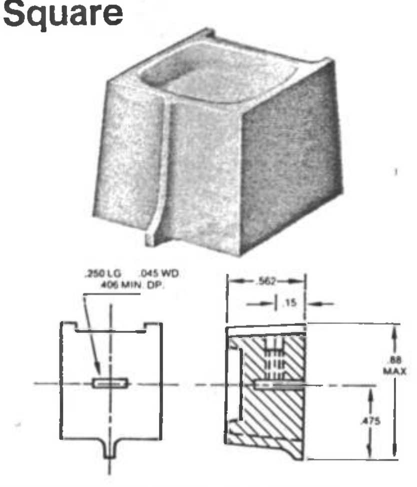
Tapered Round Style With Index Lines On Two Sides
Part No. 2-103 fits any device with actuating arm ¼" wide by 3/64" thick.

Low Profile



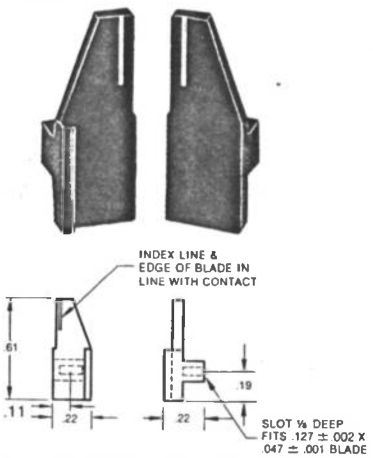
Popular Low Profile Styles With Index Line On Three Sides
Part No. 2-102 fits Series 400 controls only. (Must specify panel thickness when ordering companion control.)

Square



Modern Rectangular Contour With Molded Pointer On One Side
Part No. 2-104 fits any device with actuating arm ¼" wide by 3/64" thick.

Pointer

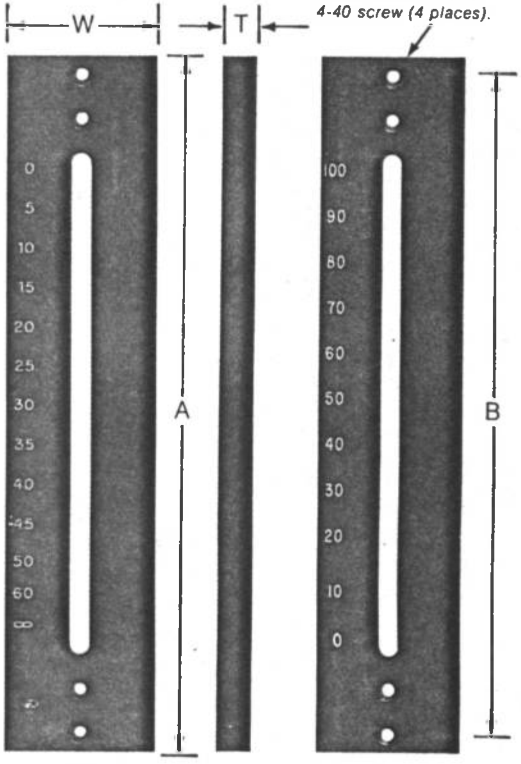


Left And Right Position Pointer Knobs With Index Line On One Side
Part No. 2-105-1 (left position knob; same dimensions as 2-105-2 shown) and Part No. 2-105-2 (right position knob) fit Series 400 Dual Wiper controls only.

To specify colors for all four styles add the following — number to part numbers:
- 1 (White) - 2 (Black) - 3 (Red) - 4 (Blue) - 5 (Yellow) - 6 (Green)
Example: Part No. 2-105-1-3 (left position pointer knob in red)

Escutcheons for Series 300 and 400 Slideline Controls

A selection of custom engraved, black anodized aluminum escutcheons is offered to fit each model of Series 300 and Series 400 SLIDELINE controls. In addition to escutcheons shown, other scales or blank escutcheons available on special order.



Countersunk hole for 4-40 screw (4 places).

EA
Audio Scale

EL
Linear Scale

Series 300 Escutcheon

Fits Model	Audio Escutcheon Part No.	A	B	T	W	Linear Escutcheon Part No.
321	EA321-15	5.0	4.625	3/16	1.5	EL321-15
341	EA341-15	7.0	6.625	3/16	1.5	EL341-15
345	EA341-15	7.0	6.625	3/16	1.5	EL345-15

Series 400 Escutcheon

Fits Model	Audio Escutcheon Part No.	A	B	T	W	Linear Escutcheon Part No.
421/ 422	EA420-15	5.0	4.625	⅛"*	1.5	EL420-15
441/ 442	EA440-15	7.0	6.625	⅛"*	1.5	EL420-15

*Available with adhesive backing in .005" thickness.

ap
allied plastics, inc.®
p.o.box 47069
doraville, ga. 30362
(404) 458-9073

PLASTIC FABRICATION - STORE FIXTURES
VACUUM FORMING - DIE CUTTING
VISUAL COMMUNICATION

#021181HRC-1

QUOTATION

TO: Hari & Associates
3915 Howard Street
Skokie, Illinois 60075

ATTENTION: Dale Murray

REFERENCE ABS Computer End Caps

F. O. B. Doraville, GA

APPROXIMATE SHIPPING DATE 8-9 Weeks ARO

TERMS
Deposit required unless otherwise arranged.

ITEM NO.	QUANTITY	DESCRIPTION	UNIT PRICE *		
			1	3	5
1.		Left end cap main console per drawing no. C-2553DD vacuum formed.	$412.00 284.33		$185.00
2.		Tooling for Item #1		$1634.00 650.00	
3.		Side console left end cap per drawing no. C-2550-D vacuum formed without hole.	$235.00 171.91		$120.00
4.		Same as Item #3 except with cut out hole.	$240.00 204.64		$125.00
5.		Tooling for Items 3 and 4.		$1145.00 470.50	
6.		Side console end cap right per drawing #C-2551-D vacuum formed without hole.	$235.00 171.91		$120.00
7.		Same as Item #6 except with hole.	$240.00 204.64		$125.00
8.		Tooling for Items 6 and 7.		$1145.00 470.50	
9.		Right end cap of main console per drawing no. C-2553-DD vacuum formed.	$412.00 284.33		$185.00
10.		Tooling for Item #9.		$1434.00 [illegible]	
			1060	1230 5358 2019	

REMARKS: *PRICES GOOD THIRTY (30) DAYS.
A 50% deposit is required on all tooling, balance on approval of prototype.

Enclosures: 3

ALLIED PLASTICS, INC.

Herman R. Cobb

BY: Herman R. Cobb, Vice Pres.

DATE: March 4, 1981

ap
allied plastics, inc.®
p.o.box 47069
doraville, ga. 30362
(404) 458-9073

PLASTIC FABRICATION - STORE FIXTURES
VACUUM FORMING - DIE CUTTING
VISUAL COMMUNICATION

#052981HRC-1

QUOTATION

TO: Computer Image Corporation
2475 W. Second Avenue
Denver, Col. 80223

ATTENTION: Ed Tajchman

REFERENCE CI System 4
F. O. B. Doraville, Georgia
APPROXIMATE SHIPPING DATE 8 - 10 weeks
TERMS Net 30 Days
Deposit required unless otherwise arranged.

ITEM NO.	QUANTITY	DESCRIPTION	UNIT PRICE *
1.	1 Set	Vacuum formed housings, foam filled. Mat. will be .125 white ABS with a hair cell finish one side.	@ 1860.00 set
2.	3 Sets	Same	@ 1230.00 set
3.	5 Sets	Same	@ 940.00 set
4.		Tooling	$5,358.00
		One set consists of: 2 - #C-2550-D, left console panels. 2 - #C-2551-D, 1 left and 1 right console panel. 1 - #C-2553-DD, left end cap main console panel. 1 - #C-2553-DD, right end cap main console panel.	

REMARKS: *PRICES GOOD THIRTY (30) DAYS.
A 50% deposit is required on all tooling, balance on approval of prototype.
Enclosure: (3)

ALLIED PLASTICS, INC.

DATE: 6/1/81

BY: Herman R Cobb Jr
Herman R. Cobb, Jr., V-Pres.

COMPUTER IMAGE
CORPORATION

2475 W. SECOND AVENUE – SUITE 4
DENVER, COLORADO 80223
TELEPHONE (303) 934-5801

PURCHASE ORDER
P.O. 6716
SHOW THIS NUMBER ON ALL DOCUMENTS

☒ CONFIRMING
☐ NON–CONFIRMING

VENDOR:
DAWN PRODUCTS
3953 S. LIPAN
P.O. BOX 1555
ENGLEWOOD, CO. 80150
JIM DICKSON 795-0908

SHIP TO:

PURCHASE ORDER DATE	BUYER	TERMS	RESALE	SHIP VIA	FOB	DATE REQUIRED
6/15/81		BELOW	YES ☒ NO ☐			7/17/81

REQUESTER	DEPARTMENT	ACCOUNT CHARGED	COMPLETED
GLENN HILL	ENG	026 + 538	

ITEM	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	AMOUNT
1	3		CI-00390 Left end cap main console dwg no C25530D	284^{83}	854.49
2	-		Tooling for item 1	620^{00}	620.00
3	3		Right end cap main console dwg no C25530D	284^{83}	854.49
4	-		Tooling for item 3	620^{00}	620.00
5	3		CI-00391 Side console left endcap dwg no C2550D	158^{93}	476.79
6	3		same as item 5 but with cut out	191^{66}	574.98
7	-		Tooling for Item 5 and 6	470^{00}	470.00
8	3		CI-00392 Side console right endcap dwg no C2551D	158^{93}	476.79
9	3		same as item 8 but with cut out	191^{66}	574.98
0	-		Tooling for item 8 and 9	470^{00}	470.00
					5992^{52}
				Tooling	2180^{00}
				Parts	3812^{52}
			TOOLING UP FRONT REST C.O.D. ITEM 2, 4, 7, AND 10 are ACCOUNT 538		

1270^{84} per set

VOICE IN DUPLICATE TO ABOVE ADDRESS
IIS ORDER SUBJECT TO TERMS AND CONDITIONS ON THE BACK HEREOF
EASE RETURN ACKNOWLEDGEMENT PROPERLY SIGNED AND DELIVERY SPECIFIED
L MERCHANDISE MUST BE ACCOMPANIED BY A DELIVERY RECEIPT

COMPUTER IMAGE CORPORATION

BY

6/16/81 Check #24885
$2180^{00} For Tooling

DAWN
PRODUCTS CO.

QUOTATION

THERMOFORMING AND MACHINING OF ALL PLASTICS – FABRICATION
AND ASSEMBLY OF PLASTIC COMPONENTS – TOOL DESIGN.

3953 SOUTH LIPAN STREET • P. O. BOX 1555 • ENGLEWOOD, COLORADO 80110 • PHONE (303) 761-2861

TO: Computer Image
2475 West 2nd Avenue Suite 4
Denver CO 80223

ATTN: Glen Hill 934-5801

DATE June 12 19 81

YOUR REFERENCE NO. 6716

THANK YOU FOR THIS OPPORTUNITY TO BE OF SERVICE.

QTY.	DESCRIPTION (Include Specifications and Part Numbers)	PRICE	TOTAL PRICE
3	PN-C2550-D End Cap Left.	158.93 ~~$171.93~~	ea.
	Add Cable Access hole	$ 32.73	
3	PN-C2550-D End Cap Right.	158.93 ~~$171.93~~	ea.
	Add Cable Access hole	$ 32.73	
3	PN-C2553-DD Main Console End Cap Left.	$284.83	ea.
3	" " " Right.	$284.83	ea.
	Wodd Form Tool Pn-C2550-D	$870.00	
	" " PN-C2553-DD	$620.00	

DELIVERY July 17, 1981

TERMS OF PAYMENT Toolig in Advance.

____% OF TOOLING CHARGES DUE UPON RECEIPT OF ORDER.

FOB POINT ____________ COLLECT ☐ PREPAID ☐

DAWN PRODUCTS COMPANY

BY Jim Dickson
Jim Dickson

TITLE Sales Manager

IF THE ABOVE ITEMS ARE NOT ORDERED WITHIN 30 DAYS OF THE DATE OF THIS QUOTATION, PLEASE CONTACT DAWN PRODUCTS CO. FOR CONFIRMATION OF PRICING AND DELIVERY. ANY ALTERATION OR DEVIATION FROM ABOVE REFERENCED SPECIFICATIONS INVOLVING EXTRA COSTS WILL BE EXECUTED ONLY UPON WRITTEN ORDERS AND WILL BE SUBJECT TO PRICE RENEGOTIATION.

MANUFACTURERS OF PLASTIC AND RELATED PRODUCTS

COMPUTER IMAGE CORPORATION

2475 W. SECOND AVENUE – SUITE 4
DENVER, COLORADO 80223
TELEPHONE (303) 934-5801

PURCHASE ORDER

P.O. 6659

SHOW THIS NUMBER ON ALL DOCUMENTS

☒ CONFIRMING
☐ NON–CONFIRMING

VENDOR:

Scope Manufacturing
6367 Arapahoe Ave.
Unit B3
Boulder, Co. 80303
DWAN 443-5796

SHIP TO:

SAME

PURCHASE ORDER DATE	BUYER	TERMS	RESALE	SHIP VIA	FOB	DATE REQUIRED
5/20/81	GLEN HILL	COD	YES ☒ NO ☐	DELIVERED	DEST	7/1/81

REQUESTER	DEPARTMENT	ACCOUNT CHARGED	COMPLETED
Glenn Hill	Engineering	020	

ITEM	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	AMOUNT
1	6		~~DWG No 2552 Main Console L bracket~~	30.62	183.72
2	12		~~2643 side console leg assem~~	124.16	1489.92
3	3		CI-00389 → 2614 Printer support tray	95.02	285.06
4	12		CI-00385 → 2606 side console back panel	118.16	1417.92
5	-		N.C. charge for 2606	90.00	90.00
6	6		DWG NO 2602A Main Console Supports	56.48	338.88
7	6		CI-00379 → 2602B	53.75	322.50
8	3		CI-00383 2603 Main console lower back	106.96	320.88
9	3		CI-00382 2604 Main console back	213.28	639.84
0	3		CI-00381 2605 Main console hood	221.11	663.33
1	12		~~2645 side console leg shroud~~	41.34	496.08
2	9		Hold? → ~~2555 Side console support~~ IS THIS PART NEEDED	15.91	143.19
3	3		Back Hood support CI-00380	57.07	171.21
		NOTE:	"PLEASE SEND ACKNOWLEDGEMENT"		~~6562.53~~ 6419.34
			NOTE ITEMS 1, 2, and 3 are Priority		

CONTROL PANEL 3@ 5 5 4 81

INVOICE IN DUPLICATE TO ABOVE ADDRESS
THIS ORDER SUBJECT TO TERMS AND CONDITIONS ON THE BACK HEREOF
PLEASE RETURN ACKNOWLEDGEMENT PROPERLY SIGNED AND DELIVERY SPECIFIED
ALL MERCHANDISE MUST BE ACCOMPANIED BY A DELIVERY RECEIPT

COMPUTER IMAGE CORPORATION

BY Joe W Santistevan

SCOPE
MANUFACTURING, INC.
6367 Arapahoe Avenue / Unit B3 / Boulder, Colorado 80303 / (303) 443-5796

May 21, 1981

Computer Image Corporation
2475 W. 2 Avenue
Denver, Colorado 80223

Attention: Glen Hill

Dear Glen,

Thank you for your request for quotation. I am pleased to quote the following work for three units:

P/N:	C-2606	12 pcs	@	$118.16	Each	Rev A
	N/C Soft Tooling one time charge of $90.00					
P/N:	C-2602'A'	6 pcs	@	$ 56.48	each	
	C-2602'B'	6 pcs	@	$ 58.75	each	
	C-2603	3 pcs	@	$106.96	each	
	C-2605	3 pcs	@	$221.11	each	
	C-2604	3 pcs	@	$213.28	each	
	C-2614	3 pcs	@	$ 95.02	each	
	C-2645	12 pcs	@	$ 41.34	each	
	C-2643	12 pcs	@	$124.16	each	
	Back Hood Support	3 pcs	@	$57.07	each	
P/N:	C-2555	9 pcs	@	$ 15.91	each	
	C-2552	6 pcs	@	$ 30.62	each	
	Keyboard Frame	3 pcs	@	$585.41	each	
	Power Supply Tray	5 pcs	@	$106.25	each	
	N/C Soft Tooling one time charge of $112.50 (2 programs)					

Terms by arrangement with management. (COD)
Delivery approximately six (6) weeks, or by arrangement.

Sincerely,

for Bruce E. Miller
President
Scope Manufacturing Inc.

BEM:dm

SCOPE
MANUFACTURING, INC.
6367 Arapahoe Avenue / Unit B3 / Boulder, Colorado 80303 / (303) 443-5796
Specialists in Sheet Metal Fabrication - Prototype and Production

3676

SOLD TO
Computer Image Corp.
2475 W. 2nd Ave
Denver, CO 80223

SHIP TO
Same

CUSTOMER ORDER NO.	DATE SHIPPED	OUR ORDER NO.	SHIPPED VIA	SALES REP ~~XXXXXX~~ TERMS	INVOICE DATE
6659	6/24/81	1141-01 - 11	Stan/Scope Truck	C.O.D.	6/24/81

QTY ORD'D	QTY. SHP'D	DESCRIPTION		
6	2	DWG No. 2552, Main Console L Bracket	[redacted]	
12	~~1~~	~~2645, Side console leg assy.~~ 5		
3	1	2614, Printer Support Tray		
12	14	2606, Side console back panel		
6	2	2602A, Main Console supports		
6	2	2602B,		
3	1	2603, Main console lower back		
3	1	2604, Main console back		
3	1	2605, Main cole hood		
12	~~1~~	~~2645, Side console leg shroud~~ 5C		
3	1	Back Hood Support		
		Parts to be delivered for fitting to be returned Monday, 6/2		

765X

PACKING LIST

"Seller represents that with respect to the production of the articles covered by this Invoice, it has fully complied with the provisions of the Fair Labor Standards Act of 1938, as amended."

Speediply ® MCP ® Patented

COMPUTER IMAGE CORPORATION

2475 W. SECOND AVENUE – SUITE 4
DENVER, COLORADO 80223
TELEPHONE (303) 934-5801

PURCHASE ORDER

P.O. 6872

SHOW THIS NUMBER ON ALL DOCUMENTS

☐ CONFIRMING
☐ NON–CONFIRMING

VENDOR:

Scope Manufacturing
6367 Arapahoe Ave
Unit B3
Boulder, Co. 80303

Dwain 443-5796

SHIP TO:

PURCHASE ORDER DATE 8/13/81	BUYER	TERMS	RESALE YES ☒ NO ☐	SHIP VIA	FOB	DATE REQUIRED 9/4/81

REQUESTER GLENN HILL	DEPARTMENT ENG	ACCOUNT CHARGED 020	COMPLETED

ITEM	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	AMOUNT
1	3	ea	C-2614 PRINTER SUPPORT TRAY REWORK	25^{00}	75^{00}
2	3	ea	CI-00256A STROBE HOUSING COVER SHEET 1 OF 2	55^{36}	166^{08}
3	3	ea	CI-00256A STROBE HOUSING SHEET 2 OF 2	90^{31}	270^{93}
4	6	ea	SIDE CONSOLE BASE 2 needed ASAP	189^{26}	1135^{56}
5	3	ea	CENTER CONSOLE BASE 1 needed ASAP	304^{05}	912^{15}
					2559^{72}

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COMPUTER IMAGE CORPORATION

BY ______________________

Quotation on **GORTITE PROTECTIVE COVERS**

nd A Manufacturing Co. Inc. GORTiTE 2300 S. Calhoun Rd., New Berlin, Wisconsin 53151 Telephone 414-786-1500

DATE MAY 21,1981

REFERENCE

OUR QUOTE NO. 35017

TO: COMPUTER IMAGE
2475 W. 2ND AVENUE
DENVER, CO 80223

ATTN: GLEN HILL

Thank you for your interest in our product We are pleased to quote you as follows

FOLDED COVER CI-00393
PER DRAWING T-18589 REV. A (A&A MFG. CO.)
EXTENDED LENGTH: 80"
RETRACTED LENGTH: 10"

2 @ $731.00 EACH

PLUS LOT CHARGE FOR NON STOCK MATERIAL
WHITE VINYL

$680.00/80 YDS.

10 YARDS MATERIAL REQUIRED PER COVER

All prices F.O.B. New Berlin, Wisconsin. Shipment 8 weeks after receipt of order. Terms: net 30.

AREA REPRESENTATIVE
GRAHAM, INC.
2777 S. TEJON
ENGLEWOOD, CO 80110
(303) 761-6363

By GARY MATTSON/MP
A and A Manufacturing Co., Inc.

COMPUTER
IMAGE
CORPORATION

2475 W. SECOND AVENUE – SUITE 4
DENVER, COLORADO 80223
TELEPHONE (303) 934-5801

PURCHASE ORDER
P.O. 6657
SHOW THIS NUMBER ON ALL DOCUMENTS

☒ CONFIRMING
☐ NON–CONFIRMING

VENDOR:

A and A Manufacturing Co.
2300 South Calhoun Rd.
New Berlin, WI. 53151

ATTN. STEVE DAY GARY MATTSON 414-786-1500

SHIP TO:

SAME

URCHASE ORDER DATE	BUYER	TERMS	RESALE	SHIP VIA	FOB	DATE REQUIRED
5/20/81	GLEN HILL	see below	YES ☒ NO ☐	UPS BLUE IF POSSIBLE	NEW BERLIN WI.	7/1/81

EQUESTER	DEPARTMENT	ACCOUNT CHARGED	COMPLETED
Glenn Hill	Engineering	[illegible] 077	

TEM	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	AMOUNT
	2	EA	Bellows as per design of Hari + Assoc (Dale Murry) Vinyl outside, Neoprene inside	731.00	1462.00
	100	YDS	Vinyl Material 100 YDS ≅ 10 YD/BELLOW EXTRA MATERIAL TO BE USED ON FUTURE BELLOWS		680.00
					2142.00
			Terms Material plus half of order ~~680.00~~ up front		1411.00
			Remainder C.O.D.		731.00
			TOTAL P.O.		#2142.00
			PLEASE SEND YOUR ACKNOWLEDGEMENT		

'OICE IN DUPLICATE TO ABOVE ADDRESS
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L MERCHANDISE MUST BE ACCOMPANIED BY A DELIVERY RECEIPT

9/4/81 GARY, SHOULD BE DONE 9/9
9/9/81 ROSE, WILL SHIP AIR 9/10

COMPUTER IMAGE CORPORATION
BY Joe M Santisteven

7/1/81 Sue, will call back 7/2
7/2/81 will ship 7/17
7/20/81 Sue, will ship 7/22 OR 23 COMMON CARRIER
7/24/81 YELLOW FREIGHT PICKUP TODAY (SUE)
8/17/81 Sue, will ship 8/18 or 19 (yellow Freight)
8/24/81 SUE, SHIPPED 8/20 [illegible]

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

September 24, 1980

Mr. Ed Teikman
Computer Image Corp.
2475 W. Second Avenue
Suite 4
Denver, CO 80223

Dear Ed:

We had a production meeting with Glenn and are looking forward to getting this project back on the road.

He pointed out several errors that will be corrected when we start up again. We are waiting for specific information on all of the compenents that will be installed into the system. The new type of printer will cause some changes but the advantages seem to be well worth the effort.

Changing the mounting of the color controller, switcher, and monitor video processor will solve the servicing problem. This will result in a smaller control panel but Glenn felt this would be acceptable. The enclosed drawings show three ways to mount these units. Please study them and contact us.

This also freed up space for the power supplies to be mounted in the main console.

The main control surface will now be supported by a 20° turret instead of a special bracket we had designed. This may cost a little more but should not be much.

It was decided that the shipping crate would be a reusable crate contracted by Amco. However, Computer Image would be required to furnish shock mounting information.

The quotes we received from Amco were based on 30 systems. There will be a price increase for 5 systems (about 10%). There was also a cost increase since we received the quote which amounted to about 10% (we'd better hurry and buy).

Their delivery schedule calls for six weeks, which appears to be well within our requirements. Are you still thinking in terms of January 15th for delivery of cabinets?

The wood cabinet parts can be made by an Amco supplier and this may be a good way to purchase the unit since they have worked together in the past. We will furnish all detail drawings to construct the cabinets.

The drawings we sent to you were to get information to you and get a reaction. I thought we sent you exploded views but I guess we only showed them to you and Lee when you were here.

Please get us all the information ASAP so we can keep this project on schedule.

Sincerely,

HARI & ASSOCIATES, INC.

Hari Matsuda
President

HM/mmh
enclosure

cc: Lee Harrison
Glenn Hill

COMPUTER IMAGE
CORPORATION
2475 WEST
SECOND
AVENUE
SUITE 4
DENVER,
COLORADO
80223
TELEPHONE
(303) 934-5801

October 7, 1980

Hari Matsuda
Hari & Associates Inc.
3915 Howard St.
Skokie, IL 60076

Hari and Dale,

Enclosed is all of the information I could come up with at this time concerning equipment that will be used in SYSTEM IV.

Please note the change in printer and disk drive.

As we previously discussed, I would like to put the switcher and color controller together creating one 14" high nest. Mounting of this nest would be as your example "C". The monitor video processor nest is only 8 3/4" high, so I've decided to add another card bay to it for control panel electronics. That causes this nest to be 19" high also. This means I will not have to put any electronics under the control panel. One thing you should be aware of is clearance of PC boards when on an extender card. Another clearance questions, will the SYSTEM IV package be able to fit through standard doors and into elevators?

That's all for now. I will let you know if there are any other changes. Call me if you have any questions.

Sincerely,

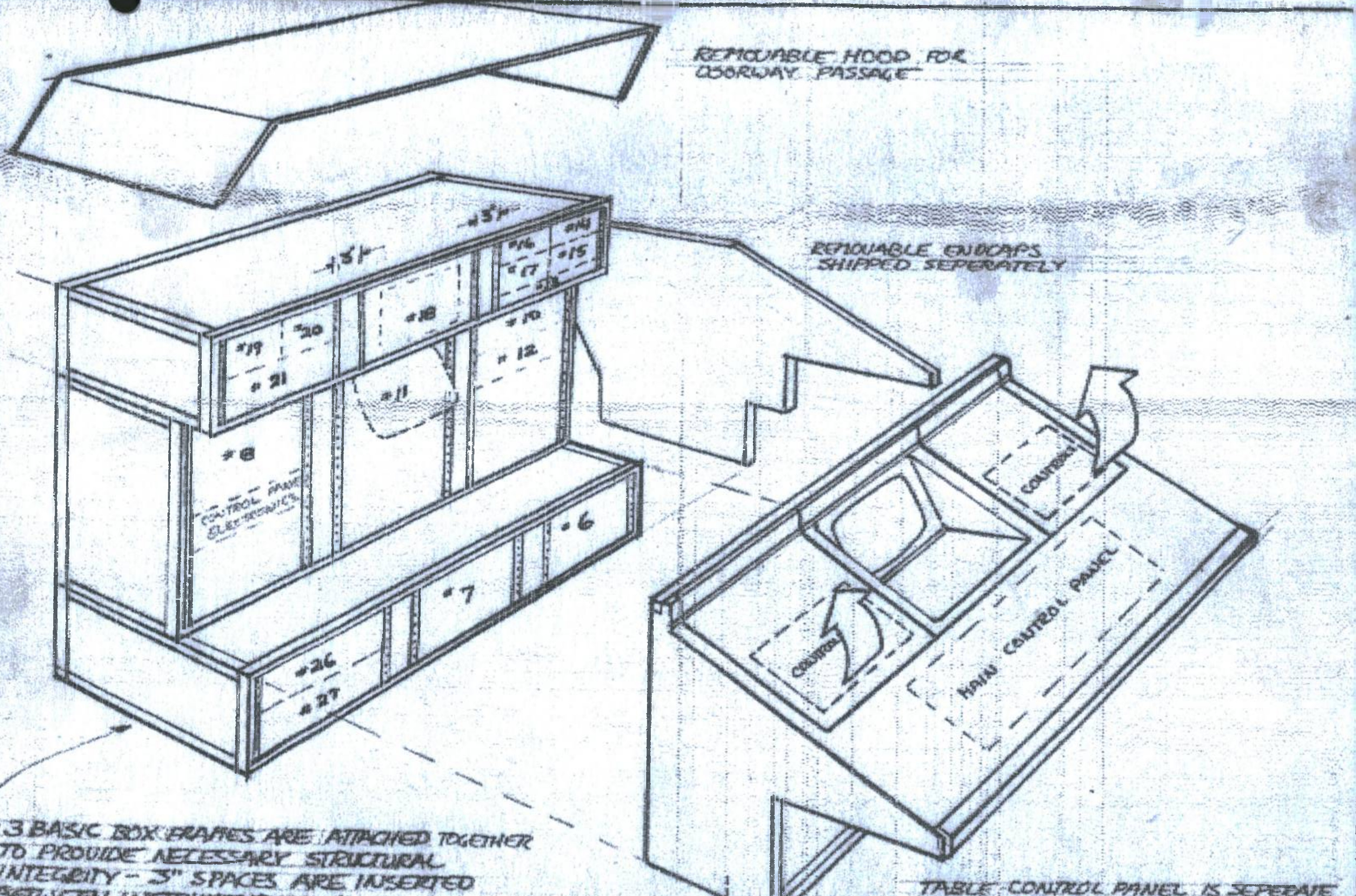
Glenn Hill

Glenn Hill
SYSTEM ENGINEER

Enclosures

GH/sn

cc: Ed Tajchman, Computer Image Corp.



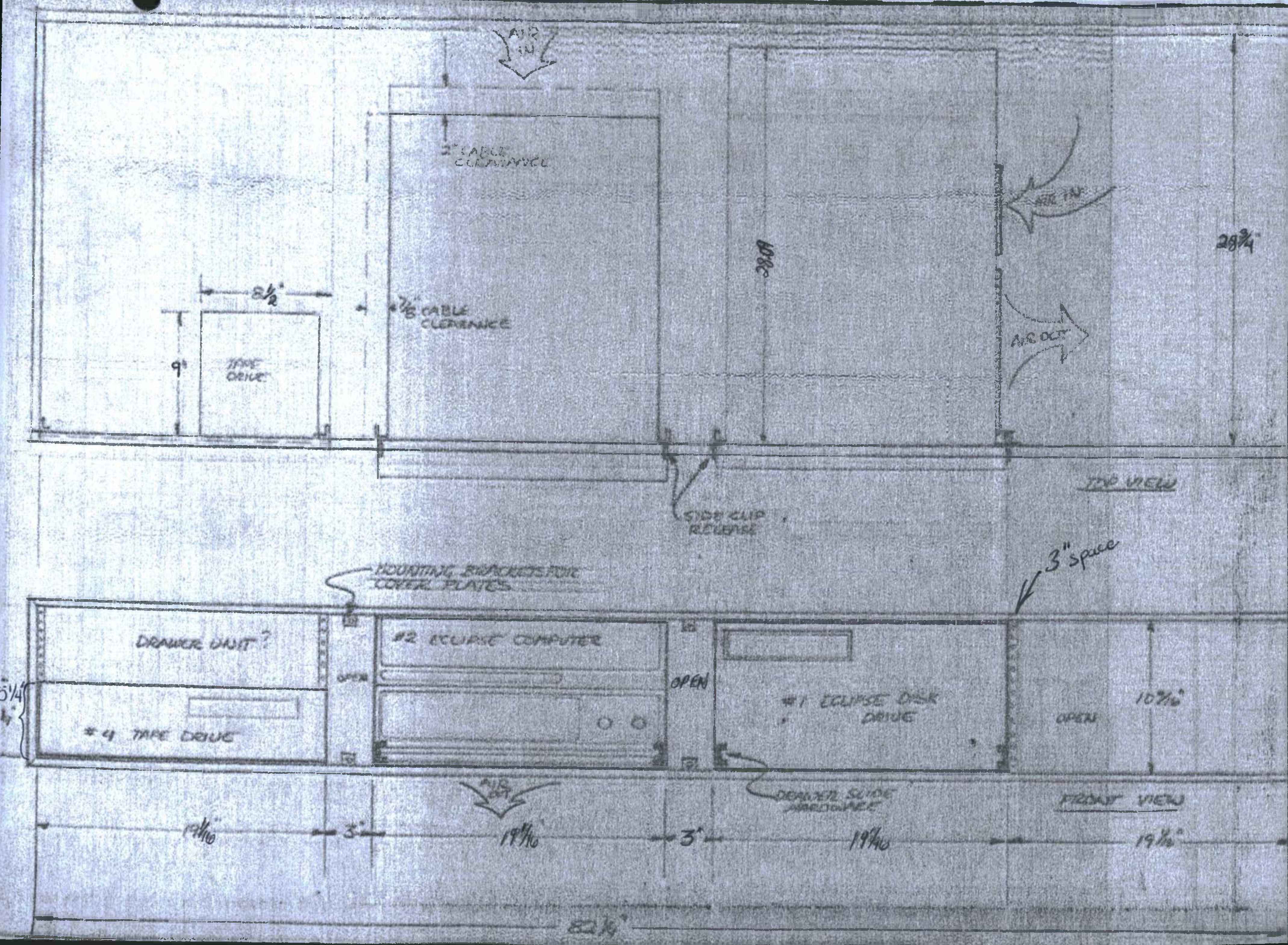
REMOVABLE HOOD FOR DOORWAY PASSAGE

REMOVABLE ENDCAPS SHIPPED SEPERATELY

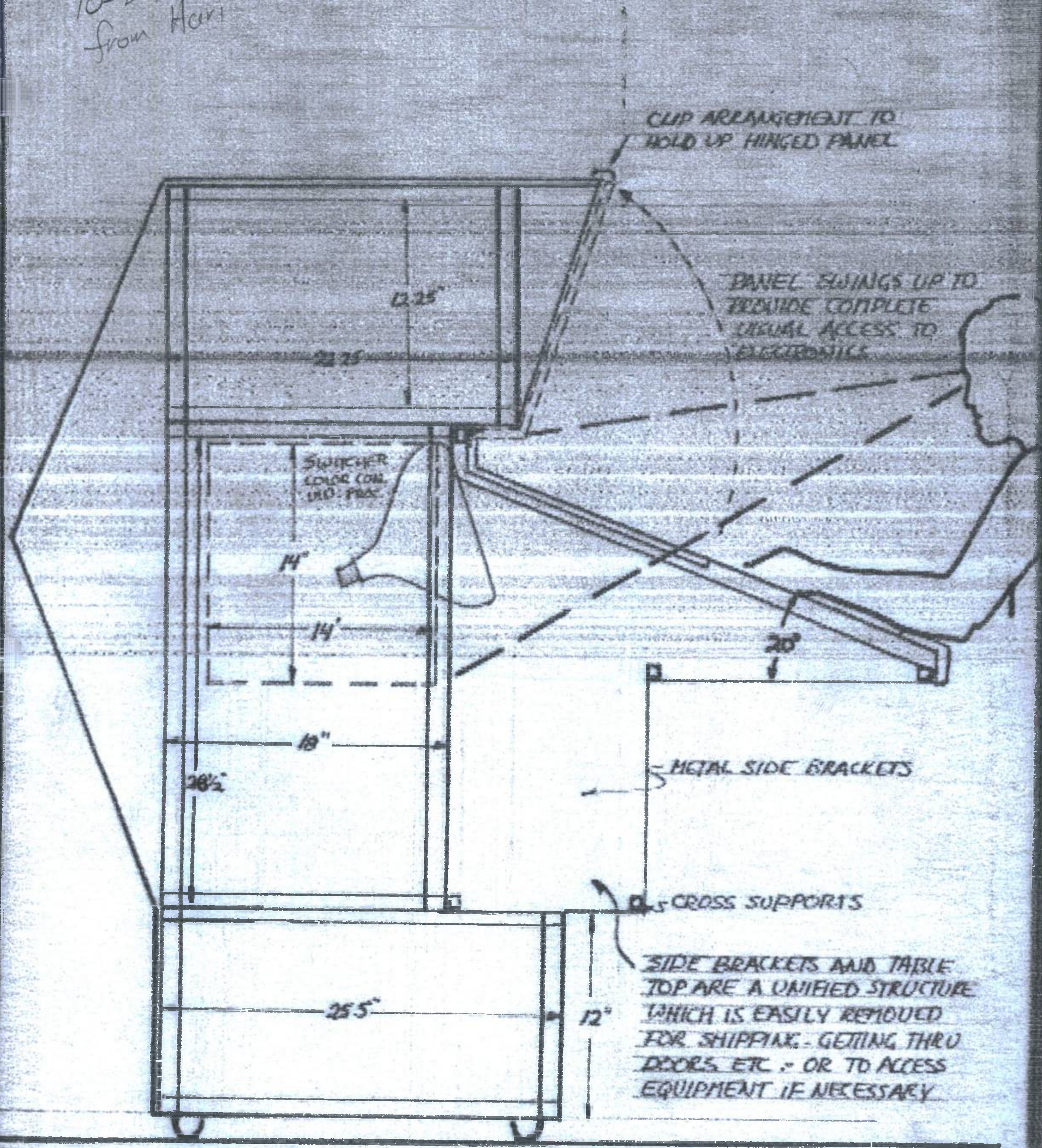
3 BASIC BOX FRAMES ARE ATTACHED TOGETHER TO PROVIDE NECESSARY STRUCTURAL INTEGRITY - 3" SPACES ARE INSERTED BETWEEN INSTRUMENT BAYS

TABLE CONTROL PANEL IS SEPERATE STRUCTURAL UNIT - SHIPPED SEPERATE
AND REMOVABLE FROM FRAME UNIT

HARI
10-24-80


AIR IN
2" CABLE CLEARANCE
8½"
9"
TAPE DRIVE
7/8" CABLE CLEARANCE
28 5/8
AIR IN
AIR OUT
28¾"
TOP VIEW
SIDE CLIP RELEASE
MOUNTING BRACKETS FOR COVER PLATES
3" space
DRAWER UNIT?
#4 TAPE DRIVE
5¼"
OPEN
#2 ECLIPSE COMPUTER
OPEN
#1 ECLIPSE DISK DRIVE
OPEN
10 7/16"
AIR OUT
DRAWER SLIDE HARDWARE
FRONT VIEW
19 1/16"
3"
19 1/16
3"
19 1/16
19 1/16"
82¼"

10-24-80
from Hari


CLIP ARRANGEMENT TO HOLD UP HINGED PANEL
PANEL SWINGS UP TO PROVIDE COMPLETE VISUAL ACCESS TO ELECTRONICS
12.25"
22.25
SWITCHER COLOR COR. VID. PROC.
14"
14'
20°
18"
28½"
METAL SIDE BRACKETS
CROSS SUPPORTS
SIDE BRACKETS AND TABLE TOP ARE A UNIFIED STRUCTURE WHICH IS EASILY REMOVED FOR SHIPPING - GETTING THRU DOORS ETC. - OR TO ACCESS EQUIPMENT IF NECESSARY
25.5"
12"

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

HARI

December 17, 1980

Mr. Glen Hill
Computer Image Corp.
1475 W. Second Ave.
Suite 4
Denver, CO 80223

Dear Glen:

Please find enclosed prints of the assembly drawings for the two side consoles. These are the preliminaries for your approval. When they are finally approved we will send you either originals or mylar copies so you can reproduce copies.

As I mentioned on the phone the piece part drawings of metal brackets, hoods, doors, end caps and all other fabricated pieces will be done on 'D' size paper to comply with your filing system. Preliminaries of the main console (minus the control panel structure assembly) and of the end caps will follow early next week.

The enclosed drawings contain a lot of information as you can see and should allow you to begin talking to local cabinet makers as we discussed.

I am also enclosing some samples of touch panel switches for you to take a look at. If any of them interest you I have names of local reps in the Chicago area who might be able to answer any questions you might have and provide costing information. As these are the only samples I have I would appreciate your returning them when you have had a chance to check them out.

If you have any questions or problems don't hesitate to call.

Have a happy holiday.

HARI & ASSOCIATES, INC.

Dale L. Murray

Dale Murray

DM/pm
enclosure

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

December 22, 1980

Mr. Glen Hill
Computer Image Corp.
2475 W. Second Ave.
Suite 4
Denver, CO 80223

Dear Glen:

Please find enclosed the main console assembly drawing and a quick sketch of the side console end cap.

When you have had a chance to look over these, give me a call and we can discuss any problems. Then we can proceed with the piece part drawings.

Sincerely,

HARI & ASSOCIATES, INC.

Dale L. Murray

Dale Murray

DM/pm

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

January 27, 1981

Mr. Glenn Hill
Computer Image Corporation
2475 W. Second Avenue
Suite 4
Denver, CO 80223

Dear Glenn:

Please find enclosed the additional set of drawings you requested for your cabinet maker.

We have now found that Amco has special Z-brackets for attaching their cabinets to flat surfaces. Using two of these brackets, they can attach two cabinets together. This will eliminate many of the specially drilled holes we specified in the drawings. This should allow your cabinet maker to simplify his attachments of the chipboard pieces. The Z-brackets are shown in cross section in red on the enclosed prints.

It may be that the only special holes necessary will be in the center console to attach the angle-iron pieces which give vertical support to the front of the 3 staggered cabinets.

Also find enclosed parts drawings for the U-channel metal bracket supports (which your cabinet maker will need in assembling the right hand cabinet) and the drawings of the angle-iron supports in the center console. As soon as we complete piece part drawings for the other metal parts, we will send them out to you.

In talking to our local cabinet maker, he suggested several changes in our drawings which I have marked in red and which should simplify construction somewhat. He also suggested that wherever possible, we should cover the opposite side of a laminated piece with phenolic backing material to retard warpage and to create a professional appearance inside the cabinet. We are trying to minimize the black line that occurs at the corner joints on laminated pieces. It was suggested that by using thinner material on vertical surfaces and the regular counter top material on horizontal surfaces, this can be accomplished. Any other suggestions would be appreciated.

Drawings of the endcaps are enclosed also as the cabinet maker requested.

Regarding color, we found that getting the Amco extrusions anodized black would be quite expensive and hold up delivery. So for the prototype we should see how the clear anodized natural aluminum will look.

The enclosed color chip form Wilson Art (#1570-6 Solid White) matches the white of the ABS endcaps so your cabinet maker should use that or match it closely.

If you or your cabinet maker have any questions, give me a call.

Sincerely,

HARI & ASSOCIATES, INC.

Dale Murray

Dale Murray

DM/mmh
enclosures

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

March 9, 1981

Mr. Glen Hill
Computer Image Corporation
2475 W. Second Ave.
Suite 4
Denver, CO 80223

Dear Glen:

Please find enclosed the drawings for most of the sheet metal parts to finish off the cabinets. I was hoping to send the details for the leg design, but I am still waiting for confirmation on the availability of the casters we specified. I will send that and the printer support tray as soon as possible.

Please note that we only located holes for the connectors on the metal pieces. We felt that the screws and resultant hole sizes should be specified by the fabricators, either your cabinet maker or sheet metal man.

If there are any questions or problems give me a call.

Sincerely,

HARI & ASSOCIATES, INC.

Dale Murray

Dale Murray

DM/pm
enc.

P.S. Also enclosed are the quotes from Allied Plastics for the endcaps.

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

April 8, 1981

Mr. Glen Hill
Computer Image Corporation
2475 W. Second Ave.
Suite 4
Denver, CO 80223

Dear Glen:

Please find enclosed drawings for the printer supporting tray and the leg assembly for the side consoles. We specified casters and a trucklock from McMasters and Carr for the leg assembly which are noted on the drawings.

The samples are being sent under seperate cover, as per our conversation on Wednesday.

When you get into town give me a call and we'll arrange to get together Friday or Monday to go over the control panel.

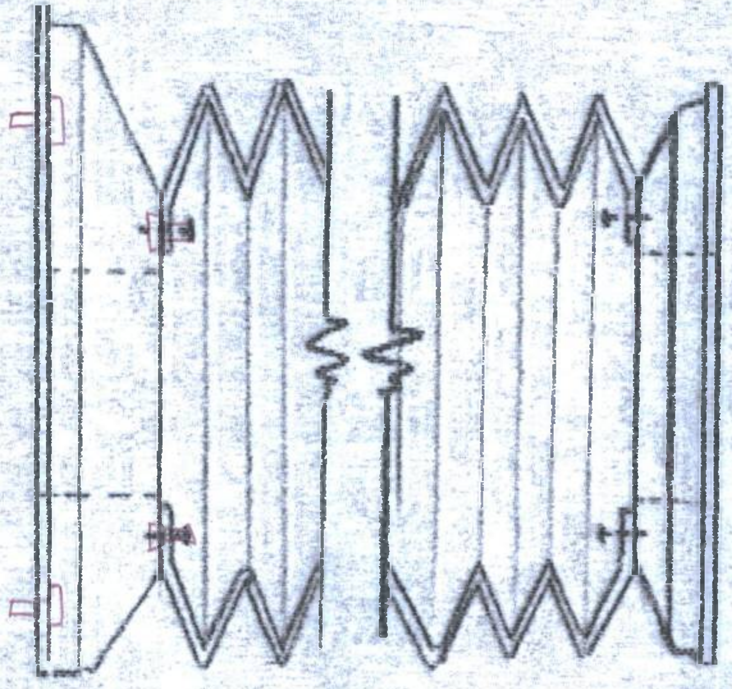
Sincerely,

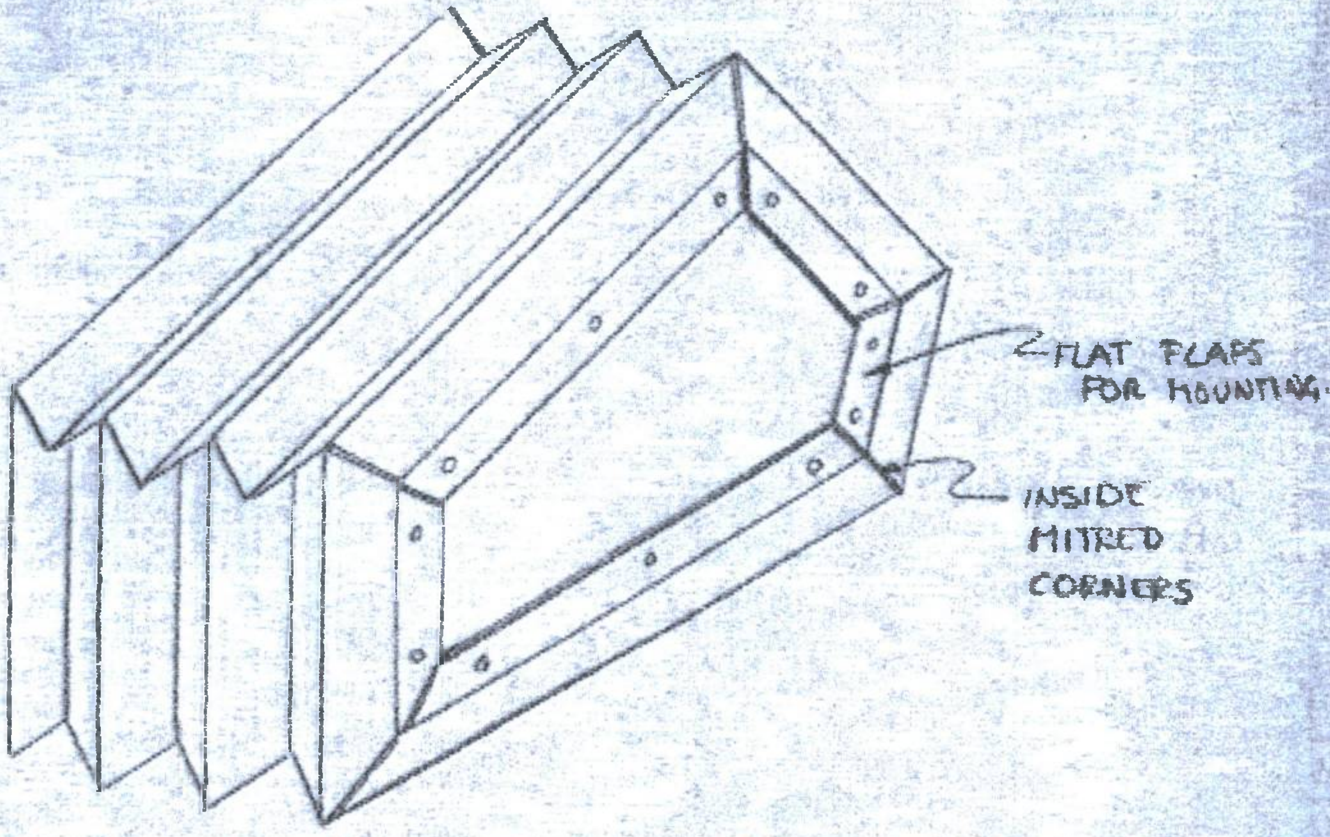
HARI & ASSOCIATES, INC.

Dale Murray

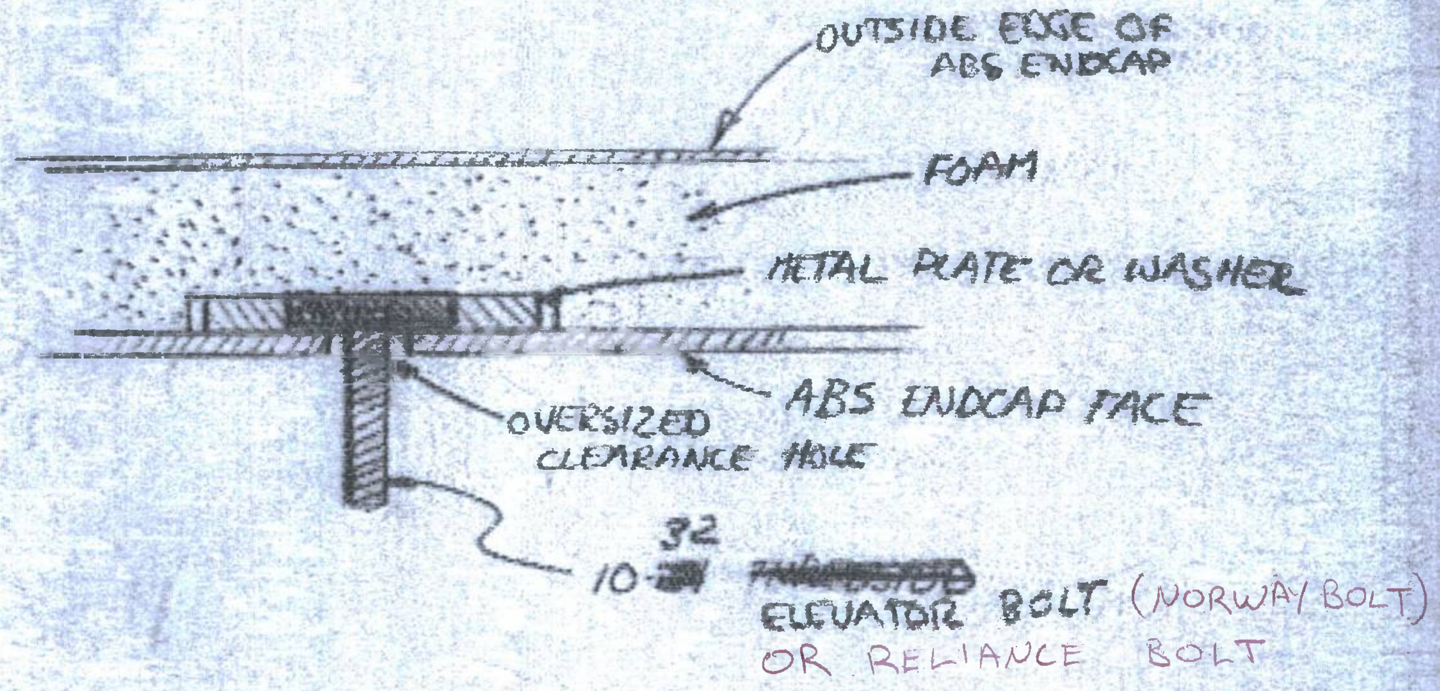
Dale Murray

DM/pm
enc.





4-27-81


OUTSIDE EDGE OF ABS ENDCAP
FOAM
METAL PLATE OR WASHER
ABS ENDCAP FACE
OVERSIZED CLEARANCE HOLE
10-~~[illegible]~~32 ~~[illegible]~~
ELEVATOR BOLT (NORWAY BOLT)
OR RELIANCE BOLT

THIS MOUNTING METHOD ALLOWS THE STUD TO BE ALLIGNED EXACTLY WITH THE PRE-DRILLED HOLES IN THE CABINET. THE ENDCAP CAN BE ADJUSTED TO FIT BEFORE TIGHTENING

4-27-81

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

HARI

May 11, 1981

Mr. Glen Hill
Computer Image Corporation
2475 W. Second Ave.
Suite 4
Denver, CO 80223

Dear Glen:

Please find enclosed the last group of drawings for System IV. I am sorry that our mistake delayed our getting these to you sooner.

I am sending copies of the final end cap drawings to Allied Plastics and A & A Manufacturing with instructions for them to contact you to initiate production. Please review the connector locations on the end cap layouts to make sure they are what you want.

The only reservations I have regarding the bellows is the off-white color of the hypalon material. I am still awaiting word on whether or not we can paint or dye the material.

We still need to resolve a design for the plex computer cover and the chain configuration between the cabinets. If I am forgetting anything please let me know.

Sincerely,

HARI & ASSOCIATES, INC.

Dale L. Murray

Dale Murray

DM/pk

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

HARI

May 15, 1981

Mr. Glen Hill
Computer Image Corporation
2475 W. Second Ave.
Suite 4
Denver, Colorado 80223

Dear Glen:

Here are the drawings that were missing. Sorry these got lost in the shuffle.

If you need anything give me a call.

Sincerely,

HARI & ASSOCIATES, INC.

Dale

Dale Murray

DM/pk
enc.

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

HARI

May 26, 1981

Mr. Glen Hill
Computer Image Corp.
2475 W. Second Ave.
Suite 4
Denver, CO 80223

Dear Glen:

Please find enclosed the drawings for the camera support column for the light box area and the bracket for mounting it to the bottom of the cabinet. The holes in the bracket are placed so that the drilled and threaded plate now used inside the column can still be used.

Also enclosed is a red-lined print locating the holes drilled in the Aamco cabinet extrusion and specs for the spacers required.

The bencher equipment we had is on its way to you via UPS in 3 seperate packages.

If you need anything else give me a call.

Sincerely,

HARI & ASSOCIATES, INC.

Dale

Dale Murray

DM/pk
enc.

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

June 19, 1981

Mr. Glen Hill
Computer Image Corporation
2475 W. Second Ave.
Suite 4
Denver, CO 80223

Dear Glen:

Please find enclosed the extra endcap drawings you requested. We are working on the caster detail on the main console and will get it to you as soon as possible.

Regards,

HARI & ASSOCIATES, INC.

Dale

Dale Murray

DM/pk
enc.

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

July 20, 1981

Mr. Glen Hill
Computer Image Corp.
2475 W. Second Ave.
Suite 4
Denver, CO 80223

Dear Glen:

Please find enclosed the drawings showing our proposed solution for the side console support assembly. Give me a call when you receive them and I will explain what we are proposing. Since I am leaving on vacation soon, Jeff Shabowski can answer any questions you may have while I am away.

Regards,

HARI & ASSOCIATES, INC.

Dale

Dale Murray

DM/pk
enc.

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

October 19, 1981

Mr. Ed Tajchman
Vice President Engineering
Computor Image
2475 W. Second Avenue
Denver, Co.

Dear Ed,

Please find enclosed the washable reproducable mylars of our drawings for the System 1V. These have not been updated recently, and I am sure you will have to make changes to them as you mentioned in your letter. We have the negatives on file, so if you need them for any reason, let me know.

I hope everything for Mexico City goes smoothly. If you need anything else, give us a call.

Sincerely,

Dale Murray

Dale Murray
Industrial Designer

DM/li
encl.

COMPUTER IMAGE CORPORATION
2475 W. SECOND AVENUE – SUITE 4
DENVER, COLORADO 80223
TELEPHONE (303) 934-5801

PURCHASE ORDER
P.O. 6872
SHOW THIS NUMBER ON ALL DOCUMENTS

☐ CONFIRMING
☐ NON–CONFIRMING

VENDOR:
Scope Manufacturing
6367 Arapahoe Ave
Unit B3
Boulder, Co. 80303
Dwain 443-5796

SHIP TO:

PURCHASE ORDER DATE	BUYER	TERMS	RESALE	SHIP VIA	FOB	DATE REQUIRED
8/13/81			YES ☒ NO ☐			9/4/81

REQUESTER	DEPARTMENT	ACCOUNT CHARGED	COMPLETED
GLENN HILL	ENG	020	

ITEM	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	AMOUNT
1	3	ea	C-2614 PRINTER SUPPORT TRAY REWORK	25 00	75 00
2	3	ea	CI-00256A STROBE HOUSING COVER SHEET 1 OF 2	55 36	166 08
3	3	ea	CI-00256A STROBE HOUSING SHEET 2 OF 2	90 31	270 93
4	6	ea	SIDE CONSOLE BASE 2 needed ASAP	189 26	1135 56
5	3	ea	CENTER CONSOLE BASE 1 needed ASAP	304 05	912 15
					2559 72

INVOICE IN DUPLICATE TO ABOVE ADDRESS
THIS ORDER SUBJECT TO TERMS AND CONDITIONS ON THE BACK HEREOF
PLEASE RETURN ACKNOWLEDGEMENT PROPERLY SIGNED AND DELIVERY SPECIFIED
ALL MERCHANDISE MUST BE ACCOMPANIED BY A DELIVERY RECEIPT

COMPUTER IMAGE CORPORATION

BY ______________________

Quotation on GORTITE PROTECTIVE COVERS

nd A Manufacturing Co. Inc. GORTITE 2300 S. Calhoun Rd., New Berlin, Wisconsin 53151 Telephone 414-786-1500

DATE MAY 21,1981

REFERENCE

OUR QUOTE NO. 35017

TO: COMPUTER IMAGE
2475 W. 2ND AVENUE
DENVER, CO 80223

ATTN: GLEN HILL

Thank you for your interest in our product We are pleased to quote you as follows

FOLDED COVER CI-00393
PER DRAWING T-18589 REV. A (A&A MFG. CO.)
EXTENDED LENGTH: 80"
RETRACTED LENGTH: 10"

2 @ $731.00 EACH

PLUS LOT CHARGE FOR NON STOCK MATERIAL
WHITE VINYL

$680.00/80 YDS.

10 YARDS MATERIAL REQUIRED PER COVER

All prices F.O.B. New Berlin, Wisconsin. Shipment 8 weeks after receipt of order. Terms: net 30.

GRAHAM, INC.
AREA REPRESENTATIVE 2777 S. TEJON
ENGLEWOOD, CO 80110
(303) 761-6363

By GARY MATTSON/MP
A and A Manufacturing Co., Inc.

[illegible]PUTER
MAGE
ORPORATION

2475 W. SECOND AVENUE – SUITE 4
DENVER, COLORADO 80223
TELEPHONE (303) 934-5801

PURCHASE ORDER
P.O. 6657
SHOW THIS NUMBER ON ALL DOCUMENTS

☒ CONFIRMING
☐ NON–CONFIRMING

ENDOR:
A and A Manufacturing Co.
2300 South Calhoun Rd.
New Berlin, WI. 53151
ATTN. ~~GARY MATTSON~~ STEVE DAY 414-786-1500

SHIP TO:
SAME

URCHASE ORDER DATE	BUYER	TERMS	RESALE	SHIP VIA	FOB	DATE REQUIRED
5/20/81	GLEN HILL	see below	YES ☒ NO ☐	UPS BLUE IF POSSIBLE	NEW BERLIN WI.	7/1/81

EQUESTER	DEPARTMENT	ACCOUNT CHARGED	COMPLETED
Glenn Hill	Engineering	[illegible] 077	

EM	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	AMOUNT
	2	EA	Bellows as per design of Hari + Assoc (Dale Murry) Vinyl outside, Neoprene inside	731.00	1462.00
	100	YDS	Vinyl Material 100 YDS ≅ 10 YD/ BELLOW		680.00
					2142.00
			EXTRA MATERIAL TO BE USED ON FUTURE BELLOWS		
			Terms		
			Material plus half of order ~~680.00~~ up front		1411.00
			Remainder C.O.D.		731.00
			TOTAL P.O.		$2142.00
			PLEASE SEND YOUR ACKNOWLEDGEMENT		

OICE IN DUPLICATE TO ABOVE ADDRESS
S ORDER SUBJECT TO TERMS AND CONDITIONS ON THE BACK HEREOF
ASE RETURN ACKNOWLEDGEMENT PROPERLY SIGNED AND DELIVERY SPECIFIED
MERCHANDISE MUST BE ACCOMPANIED BY A DELIVERY RECEIPT

9/4/81 GARY, SHOULD BE DONE 9/9
9/9/81 ROSE, WILL SHIP AIR 9/10

COMPUTER IMAGE CORPORATION
BY

7/1/81 Sue, will call back 7/2
7/2/81 will ship 7/17
7/20/81 Sue, will ship 7/22 OR 23 COMMON CARRIER
7/24/81 YELLOW FREIGHT PICKUP TODAY (SUE)
8/17/81 Sue, will ship 8/18 or 19 (yellow Freight)
8/24/81 SUE, SHIPPED 8/20 McLean

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

September 24, 1980

Mr. Ed Teikman
Computer Image Corp.
2475 W. Second Avenue
Suite 4
Denver, CO 80223

Dear Ed:

We had a production meeting with Glenn and are looking forward to getting this project back on the road.

He pointed out several errors that will be corrected when we start up again. We are waiting for specific information on all of the compenents that will be installed into the system. The new type of printer will cause some changes but the advantages seem to be well worth the effort.

Changing the mounting of the color controller, switcher, and monitor video processor will solve the servicing problem. This will result in a smaller control panel but Glenn felt this would be acceptable. The enclosed drawings show three ways to mount these units. Please study them and contact us.

This also freed up space for the power supplies to be mounted in the main console.

The main control surface will now be supported by a 20° turret instead of a special bracket we had designed. This may cost a little more but should not be much.

It was decided that the shipping crate would be a reusable crate contracted by Amco. However, Computer Image would be required to furnish shock mounting information.

The quotes we received from Amco were based on 30 systems. There will be a price increase for 5 systems (about 10%). There was also a cost increase since we received the quote which amounted to about 10% (we'd better hurry and buy).

Their delivery schedule calls for six weeks, which appears to be well within our requirements. Are you still thinking in terms of January 15th for delivery of cabinets?

The wood cabinet parts can be made by an Amco supplier and this may be a good way to purchase the unit since they have worked together in the past. We will furnish all detail drawings to construct the cabinets.

The drawings we sent to you were to get information to you and get a reaction. I thought we sent you exploded views but I guess we only showed them to you and Lee when you were here.

Please get us all the information ASAP so we can keep this project on schedule.

Sincerely,

HARI & ASSOCIATES, INC.

Hari Matsuda
President

HM/mmh
enclosure

cc: Lee Harrison
Glenn Hill

COMPUTER
IMAGE
CORPORATION

2475 WEST
SECOND
AVENUE
SUITE 4
DENVER,
COLORADO
80223

TELEPHONE
(303) 934-5801

October 7, 1980

Hari Matsuda
Hari & Associates Inc.
3915 Howard St.
Skokie, IL 60076

Hari and Dale,

Enclosed is all of the information I could come up with at this time concerning equipment that will be used in SYSTEM IV.

Please note the change in printer and disk drive.

As we previously discussed, I would like to put the switcher and color controller together creating one 14" high nest. Mounting of this nest would be as your example "C". The monitor video processor nest is only 8 3/4" high, so I've decided to add another card bay to it for control panel electronics. That causes this nest to be 19" high also. This means I will not have to put any electronics under the control panel. One thing you should be aware of is clearance of PC boards when on an extender card. Another clearance questions, will the SYSTEM IV package be able to fit through standard doors and into elevators?

That's all for now. I will let you know if there are any other changes. Call me if you have any questions.

Sincerely,

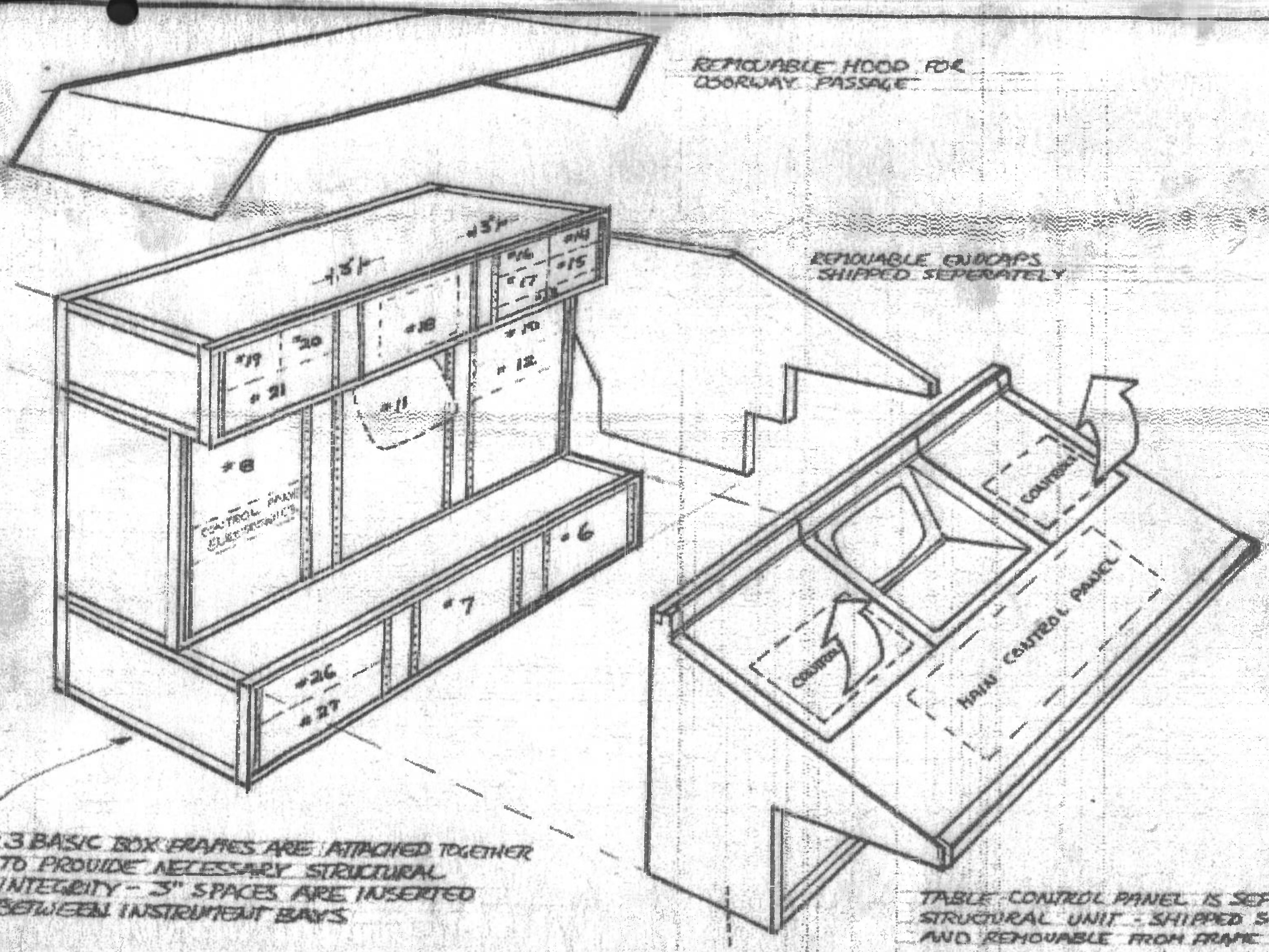
Hill

Glenn Hill
SYSTEM ENGINEER

Enclosures

GH/sn

cc: Ed Tajchman, Computer Image Corp.



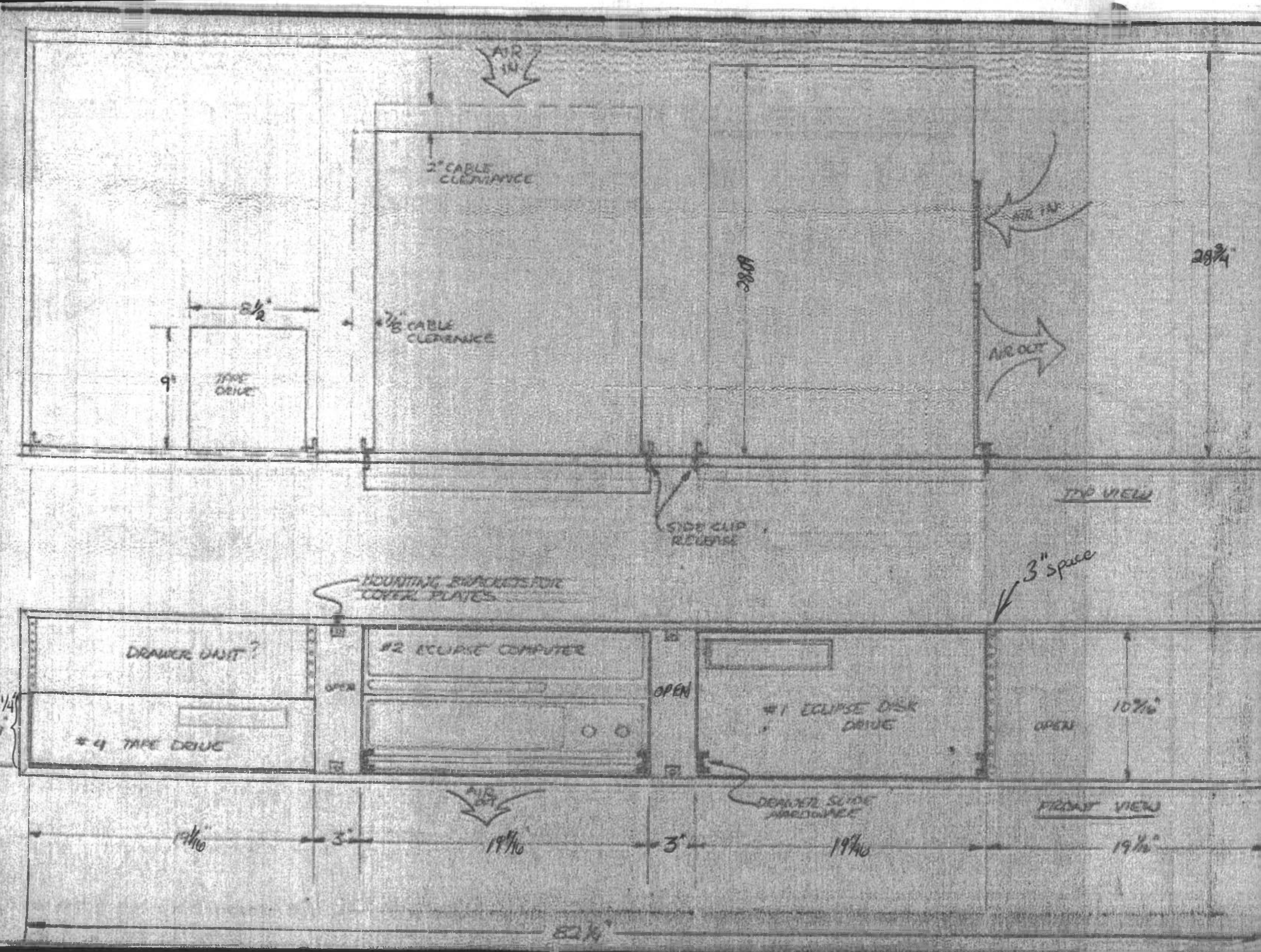
REMOVABLE HOOD FOR DOORWAY PASSAGE

REMOVABLE ENDCAPS SHIPPED SEPERATELY

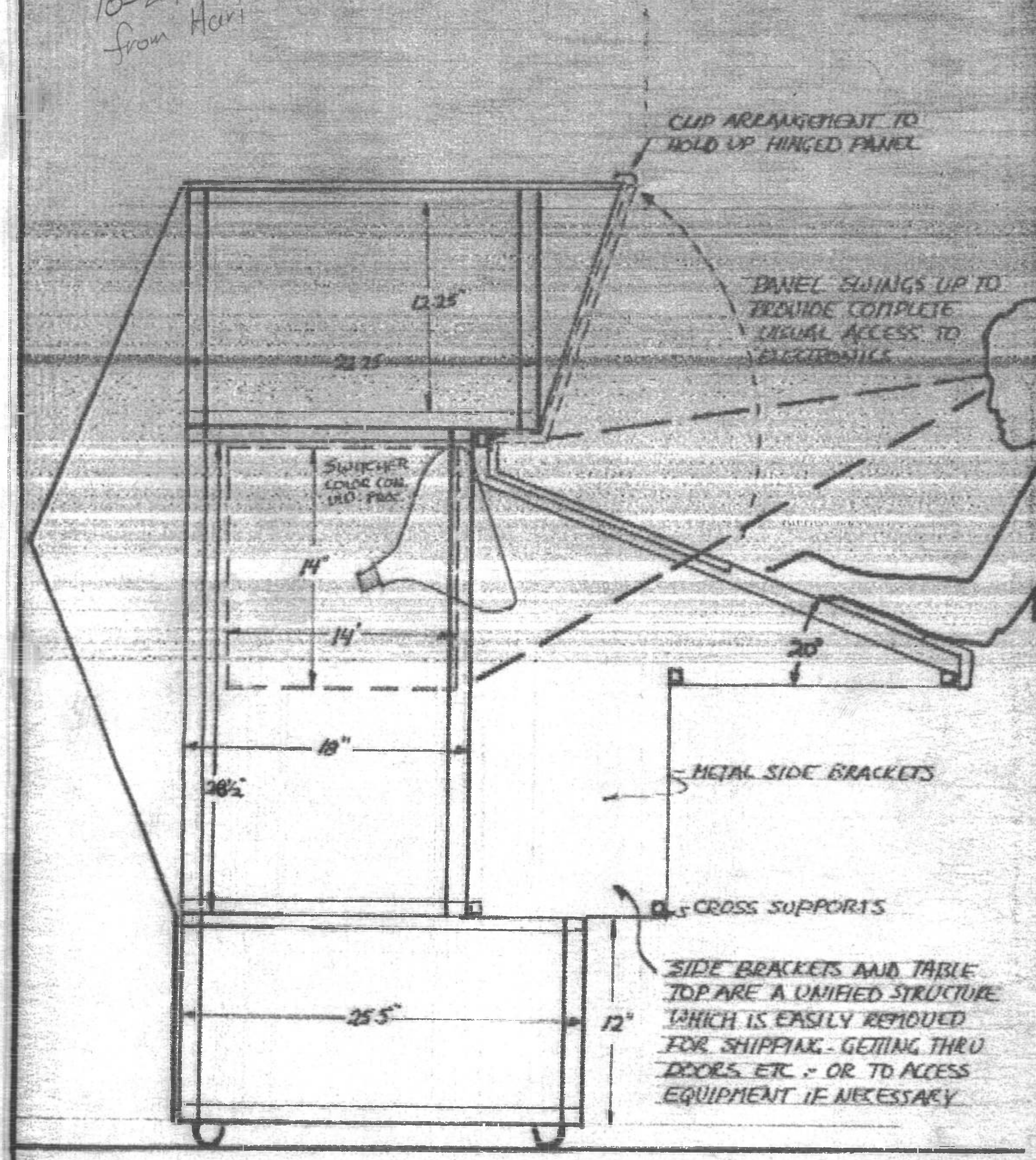
3 BASIC BOX FRAMES ARE ATTACHED TOGETHER TO PROVIDE NECESSARY STRUCTURAL INTEGRITY - 3" SPACES ARE INSERTED BETWEEN INSTRUMENT BAYS

TABLE CONTROL PANEL IS SEPERATE STRUCTURAL UNIT - SHIPPED SEPERAT
AND REMOVABLE FROM FRAME UNIT

HARL
10-24-80


AIR IN
2" CABLE CLEARANCE
8½"
9"
TAPE DRIVE
7/8" CABLE CLEARANCE
28.06
AIR IN
AIR OUT
28¾"
TOP VIEW
SIDE CLIP RELEASE
3" space
MOUNTING BRACKETS FOR COVER PLATES
DRAWER UNIT?
OPEN
#2 ECLIPSE COMPUTER
OPEN
#1 ECLIPSE DISK DRIVE
10 9/16"
OPEN
5¼"
#4 TAPE DRIVE
AIR OUT
DRAWER SLIDE HARDWARE
FRONT VIEW
19 1/16"
3"
19 1/16"
3"
19 1/16"
19 1/16"
82¼"

10-24-80
from Hari


CLIP ARRANGEMENT TO HOLD UP HINGED PANEL
PANEL SWINGS UP TO PROVIDE COMPLETE VISUAL ACCESS TO ELECTRONICS
12.25"
22.25
SWITCHER COLOR COR. VID. PROC.
14"
14"
20°
18"
28½"
METAL SIDE BRACKETS
CROSS SUPPORTS
SIDE BRACKETS AND TABLE TOP ARE A UNIFIED STRUCTURE WHICH IS EASILY REMOVED FOR SHIPPING - GETTING THRU DOORS ETC. - OR TO ACCESS EQUIPMENT IF NECESSARY
25.5"
12"

Hari & Associates Inc. 3315 Howard Street Skokie, IL. 60076 312 677-3777

December 17, 1980

Mr. Glen Hill
Computer Image Corp.
1475 W. Second Ave.
Suite 4
Denver, CO 80223

Dear Glen:

Please find enclosed prints of the assembly drawings for the two side consoles. These are the preliminaries for your approval. When they are finally approved we will send you either originals or mylar copies so you can reproduce copies.

As I mentioned on the phone the piece part drawings of metal brackets, hoods, doors, end caps and all other fabricated pieces will be done on 'D' size paper to comply with your filing system. Preliminaries of the main console (minus the control panel structure assembly) and of the end caps will follow early next week.

The enclosed drawings contain a lot of information as you can see and should allow you to begin talking to local cabinet makers as we discussed.

I am also enclosing some samples of touch panel switches for you to take a look at. If any of them interest you I have names of local reps in the Chicago area who might be able to answer any questions you might have and provide costing information. As these are the only samples I have I would appreciate your returning them when you have had a chance to check them out.

If you have any questions or problems don't hesitate to call.

Have a happy holiday.

HARI & ASSOCIATES, INC.

Dale L. Murray

Dale Murray

DM/pm
enclosure

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

December 22, 1980

Mr. Glen Hill
Computer Image Corp.
2475 W. Second Ave.
Suite 4
Denver, CO 80223

Dear Glen:

Please find enclosed the main console assembly drawing and a quick sketch of the side console end cap.

When you have had a chance to look over these, give me a call and we can discuss any problems. Then we can proceed with the piece part drawings.

Sincerely,

HARI & ASSOCIATES, INC.

Dale L. Murray

Dale Murray

DM/pm

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

January 27, 1981

Mr. Glenn Hill
Computer Image Corporation
2475 W. Second Avenue
Suite 4
Denver, CO 80223

Dear Glenn:

Please find enclosed the additional set of drawings you requested for your cabinet maker.

We have now found that Amco has special Z-brackets for attaching their cabinets to flat surfaces. Using two of these brackets, they can attach two cabinets together. This will eliminate many of the specially drilled holes we specified in the drawings. This should allow your cabinet maker to simplify his attachments of the chipboard pieces. The Z-brackets are shown in cross section in red on the enclosed prints.

It may be that the only special holes necessary will be in the center console to attach the angle-iron pieces which give vertical support to the front of the 3 staggered cabinets.

Also find enclosed parts drawings for the U-channel metal bracket supports (which your cabinet maker will need in assembling the right hand cabinet) and the drawings of the angle-iron supports in the center console. As soon as we complete piece part drawings for the other metal parts, we will send them out to you.

In talking to our local cabinet maker, he suggested several changes in our drawings which I have marked in red and which should simplify construction somewhat. He also suggested that wherever possible, we should cover the opposite side of a laminated piece with phenolic backing material to retard warpage and to create a professional appearance inside the cabinet. We are trying to minimize the black line that occurs at the corner joints on laminated pieces. It was suggested that by using thinner material on vertical surfaces and the regular counter top material on horizontal surfaces, this can be accomplished. Any other suggestions would be appreciated.

Drawings of the endcaps are enclosed also as the cabinet maker requested.

Regarding color, we found that getting the Amco extrusions anodized black would be quite expensive and hold up delivery. So for the prototype we should see how the clear anodized natural aluminum will look.

The enclosed color chip form Wilson Art (#1570-6 Solid White) matches the white of the ABS endcaps so your cabinet maker should use that or match it closely.

If you or your cabinet maker have any questions, give me a call.

Sincerely,

HARI & ASSOCIATES, INC.

Dale Murray

Dale Murray

DM/mmh
enclosures

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

HARI

March 9, 1981

Mr. Glen Hill
Computer Image Corporation
2475 W. Second Ave.
Suite 4
Denver, CO 80223

Dear Glen:

Please find enclosed the drawings for most of the sheet metal parts to finish off the cabinets. I was hoping to send the details for the leg design, but I am still waiting for confirmation on the availability of the casters we specified. I will send that and the printer support tray as soon as possible.

Please note that we only located holes for the connectors on the metal pieces. We felt that the screws and resultant hole sizes should be specified by the fabricators, either your cabinet maker or sheet metal man.

If there are any questions or problems give me a call.

Sincerely,

HARI & ASSOCIATES, INC.

Dale Murray

Dale Murray

DM/pm
enc.

P.S. Also enclosed are the quotes from Allied Plastics for the endcaps.

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

HARI

April 8, 1981

Mr. Glen Hill
Computer Image Corporation
2475 W. Second Ave.
Suite 4
Denver, CO 80223

Dear Glen:

Please find enclosed drawings for the printer supporting tray and the leg assembly for the side consoles. We specified casters and a trucklock from McMasters and Carr for the leg assembly which are noted on the drawings.

The samples are being sent under seperate cover, as per our conversation on Wednesday.

When you get into town give me a call and we'll arrange to get together Friday or Monday to go over the control panel.

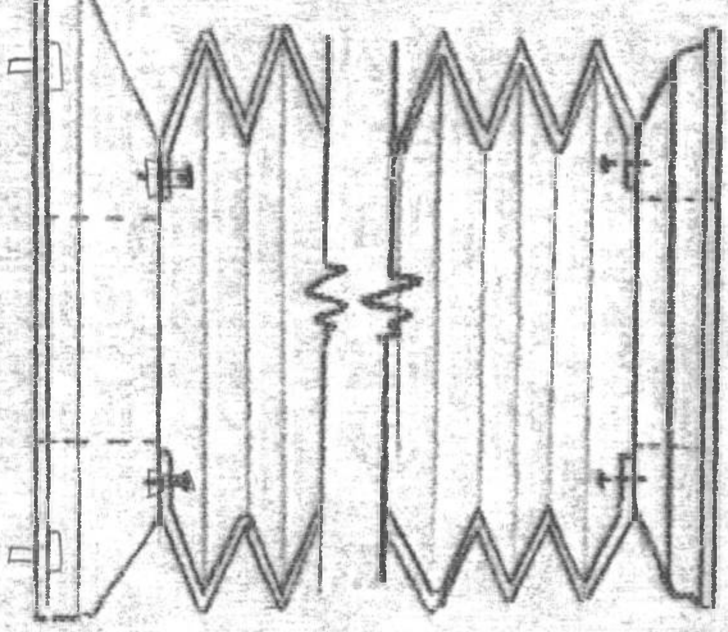
Sincerely,

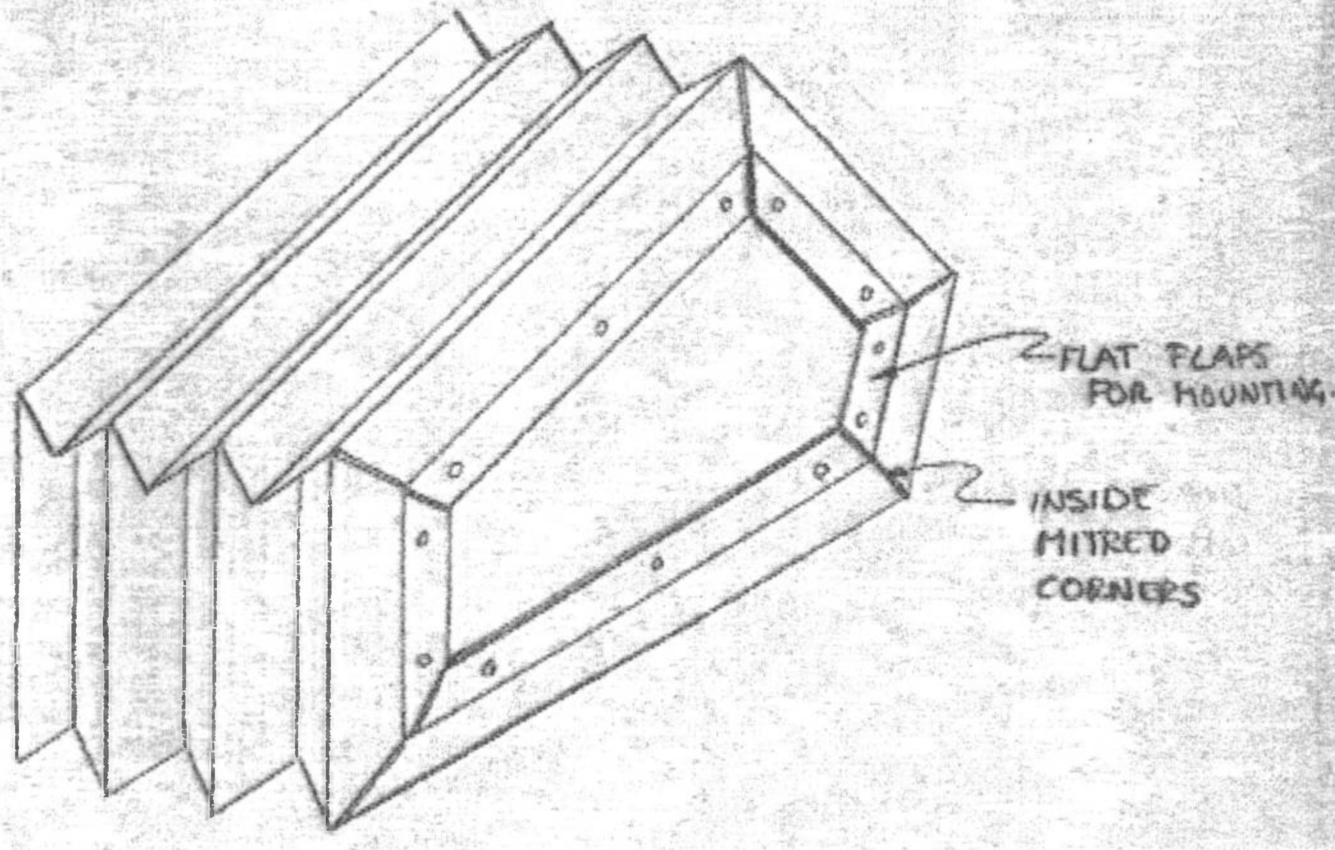
HARI & ASSOCIATES, INC.

Dale Murray

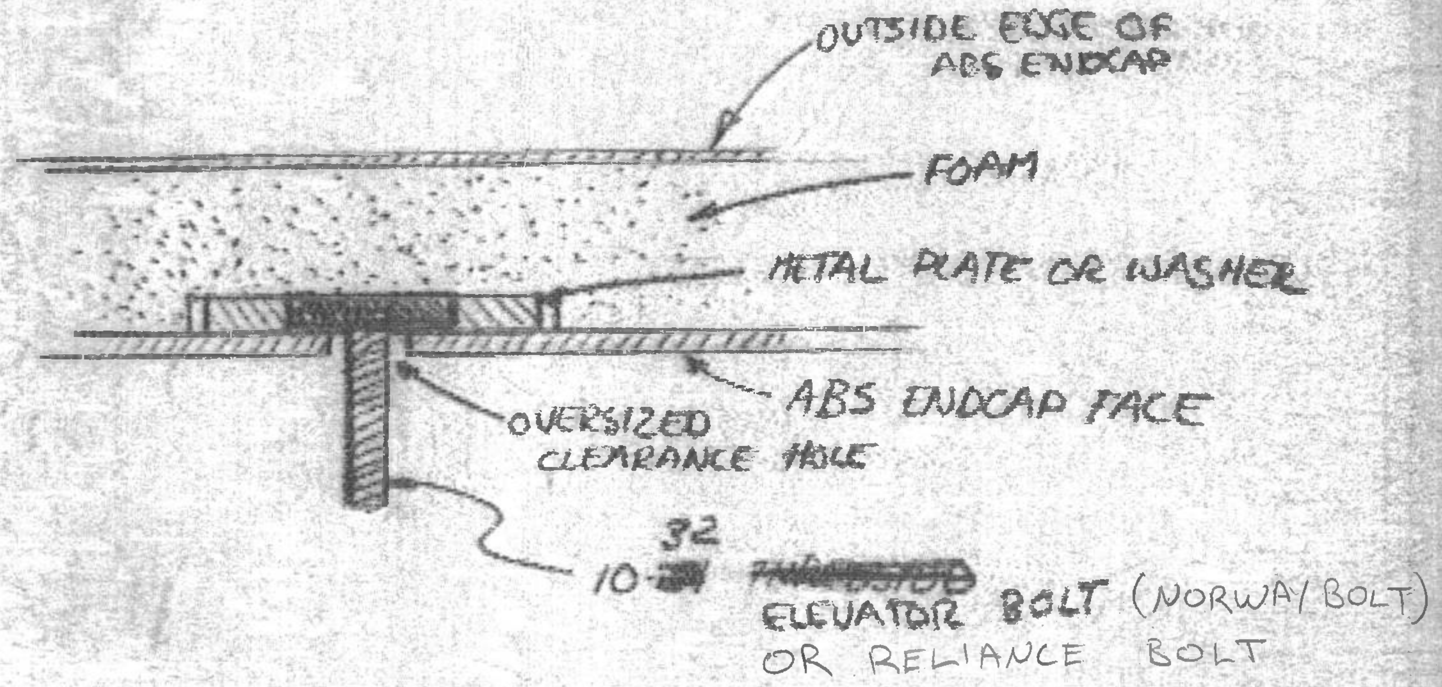
Dale Murray

DM/pm
enc.





4-27-81


OUTSIDE EDGE OF ABS ENDCAP
FOAM
METAL PLATE OR WASHER
ABS ENDCAP FACE
OVERSIZED CLEARANCE HOLE
10-32 ELEVATOR BOLT (NORWAY BOLT) OR RELIANCE BOLT

THIS MOUNTING METHOD ALLOWS THE STUD TO BE ALLIGNED EXACTLY WITH THE PRE-DRILLED HOLES IN THE CABINET. THE ENDCAP CAN BE ADJUSTED TO FIT BEFORE TIGHTENING

4-27-81

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

HARI

May 11, 1981

Mr. Glen Hill
Computer Image Corporation
2475 W. Second Ave.
Suite 4
Denver, CO 80223

Dear Glen:

Please find enclosed the last group of drawings for System IV. I am sorry that our mistake delayed our getting these to you sooner.

I am sending copies of the final end cap drawings to Allied Plastics and A & A Manufacturing with instructions for them to contact you to initiate production. Please review the connector locations on the end cap layouts to make sure they are what you want.

The only reservations I have regarding the bellows is the off-white color of the hypalon material. I am still awaiting word on whether or not we can paint or dye the material.

We still need to resolve a design for the plex computer cover and the chain configuration between the cabinets. If I am forgetting anything please let me know.

Sincerely,

HARI & ASSOCIATES, INC.

Dale L. Murray

Dale Murray

DM/pk

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

HARi

May 15, 1981

Mr. Glen Hill
Computer Image Corporation
2475 W. Second Ave.
Suite 4
Denver, Colorado 80223

Dear Glen:

Here are the drawings that were missing. Sorry these got lost in the shuffle.

If you need anything give me a call.

Sincerely,

HARI & ASSOCIATES, INC.

Dale

Dale Murray

DM/pk
enc.

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

May 26, 1981

Mr. Glen Hill
Computer Image Corp.
2475 W. Second Ave.
Suite 4
Denver, CO 80223

Dear Glen:

Please find enclosed the drawings for the camera support column for the light box area and the bracket for mounting it to the bottom of the cabinet. The holes in the bracket are placed so that the drilled and threaded plate now used inside the column can still be used.

Also enclosed is a red-lined print locating the holes drilled in the Aamco cabinet extrusion and specs for the spacers required.

The bencher equipment we had is on its way to you via UPS in 3 seperate packages.

If you need anything else give me a call.

Sincerely,

HARI & ASSOCIATES, INC.

Dale

Dale Murray

DM/pk
enc.

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

June 19, 1981

Mr. Glen Hill
Computer Image Corporation
2475 W. Second Ave.
Suite 4
Denver, CO 80223

Dear Glen:

Please find enclosed the extra endcap drawings you requested. We are working on the caster detail on the main console and will get it to you as soon as possible.

Regards,

HARI & ASSOCIATES, INC.

Dale

Dale Murray

DM/pk
enc.

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

July 20, 1981

Mr. Glen Hill
Computer Image Corp.
2475 W. Second Ave.
Suite 4
Denver, CO 80223

Dear Glen:

Please find enclosed the drawings showing our proposed solution for the side console support assembly. Give me a call when you receive them and I will explain what we are proposing. Since I am leaving on vacation soon, Jeff Shabowski can answer any questions you may have while I am away.

Regards,

HARI & ASSOCIATES, INC.

Dale

Dale Murray

DM/pk
enc.

Hari & Associates Inc. 3915 Howard Street Skokie, IL. 60076 312-677-3777

October 19, 1981

Mr. Ed Tajchman
Vice President Engineering
Computor Image
2475 W. Second Avenue
Denver, Co.

Dear Ed,

Please find enclosed the washable reproducable mylars of our drawings for the System 1V. These have not been updated recently, and I am sure you will have to make changes to them as you mentioned in your letter. We have the negatives on file, so if you need them for any reason, let me know.

I hope everything for Mexico City goes smoothly. If you need anything else, give us a call.

Sincerely,

Dale Murray

Dale Murray
Industrial Designer

DM/li
encl.

7,063 KW

SYSTEM IV POWER SUPPLIES 3/31/81 gA

Main Power Supply Drawer

CPS500-5	+5V @ 50A	Feeds FG, RPU 1, RPU 2
SPS 90D-12/15	±15V @ 3A	
SPS 60D-5/12	-5V @ 3A	
	+12V @ 1.8	
SLS 92-5	+5V @ 12A	Feeds Control Panel
SPS 15-5	-5V @ 1.5A	
V5R 12 Reliability Inc	-12V @ 80ma	

Scanconverter Power Supply

Sola 281561-2	+48V @ 10A	Feeds Scanconverter HR Monitor
(220VAC 50Hz 282228)	-48V @ 10A	
SLS-32-24	+24V @ 1.5A	
30BT-9/18/18	±18V @ .5A	
	+9V @ 1.0A	

Scanconverter H.R. Monitor

±18V
+9V } Regulated down to ±15V, ±5V } Feeds Scanconverter
provided HR Mon, Overlap, MVP

±48V provides the ±36V Feeds Scanconverter HR Mon, Overlap

Switcher / Color Controller

SPS 80T-5/12/15	+5V @ 5A
	±15V @ 1.6A
SPS15-5	-5V @ 1.5A

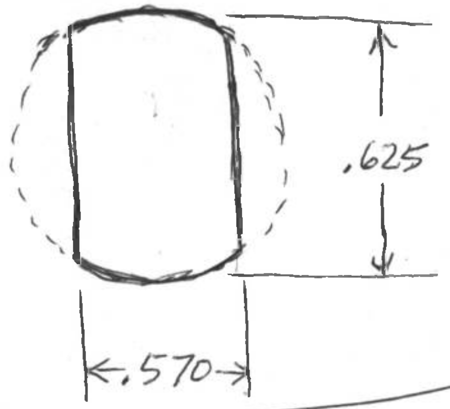
Tape Drive

Micro computer Power CP148 ±24V @ 1.8A
+5V @ 6A

All supplies are "STANDARD POWER" unless noted

INFO FOR
MEL

.031   216AGE   15 10



R 16 04

SRR-20

MFG - VOLTREX ← 16N1048 ← NEWARK PAGE 492

STRAIN RELIEF FOR 3-#18 (WIRES) SJ (CORD TYPE) .330 IN (CABLE O.D.)

INFO FOR JOE

ALTERNATE DESIGNATION: 18/3-SJ
STORM PRODUCTS

COMPUTER IMAGE CORPORATION

BALLOT

The undersigned, being the owner(s) of ________________ shares of Computer Image Corporation $.10 par value of common stock, hereby vote(s):

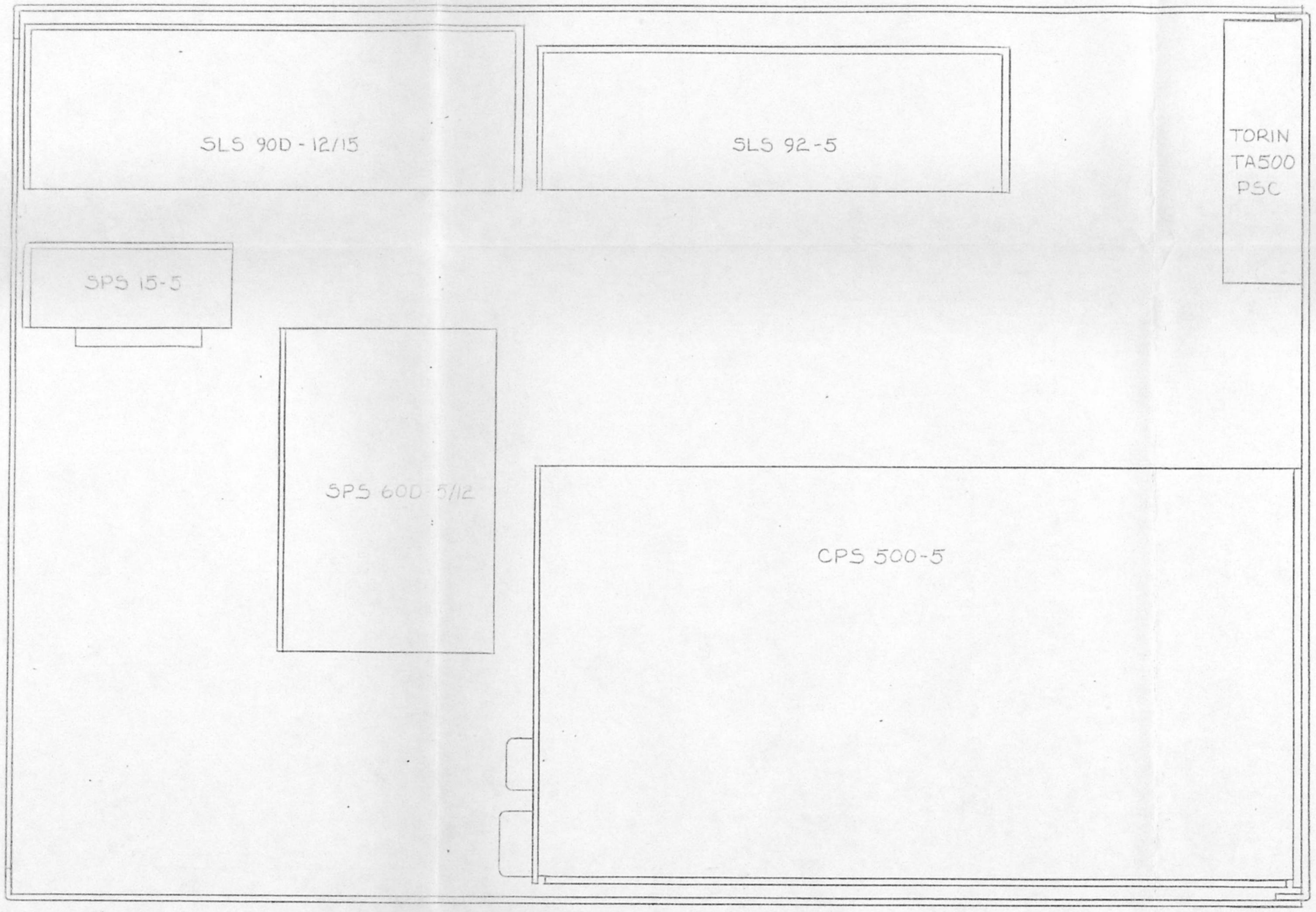
(1) For the election of the following persons as directors of the company, as follows:

Lee Harrison III ______________________ votes
David D. Connell ______________________ votes
Robert C. Gathers ______________________ votes
Daniel J. Yomine ______________________ votes
Mark G. Benz ______________________ votes

(2) ______________ for ______________ against ratification of the selection of Arthur Young & Company, as auditors for the year ending June 30, 1981.

Dated: February 25, 1981 ______________________________

____



TOLERANCE		
FRACT	±	1/32
.XX	±	.015
.XXX	±	.005

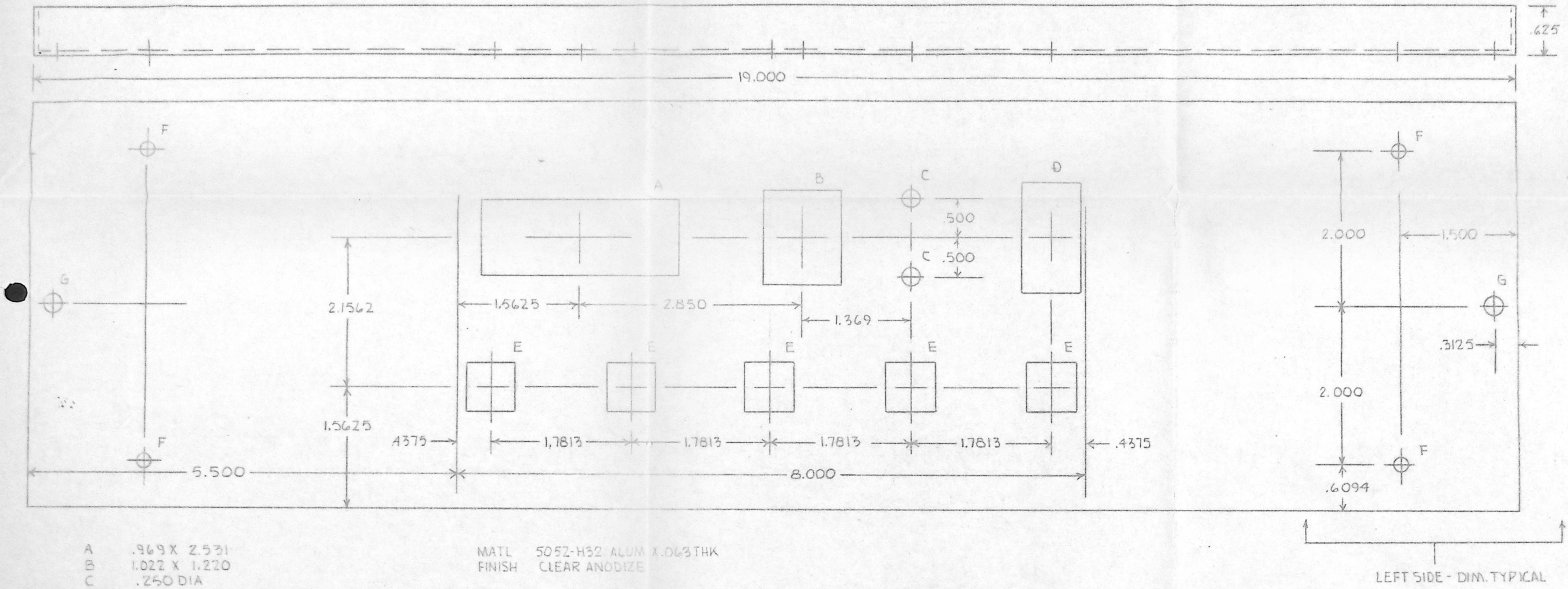
COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE
DENVER, COLORADO 80223

		REVISIONS	BY	DATE
SCALE				
DATE				
DR'N	CKD			
AP'VD				

TITLE

NO



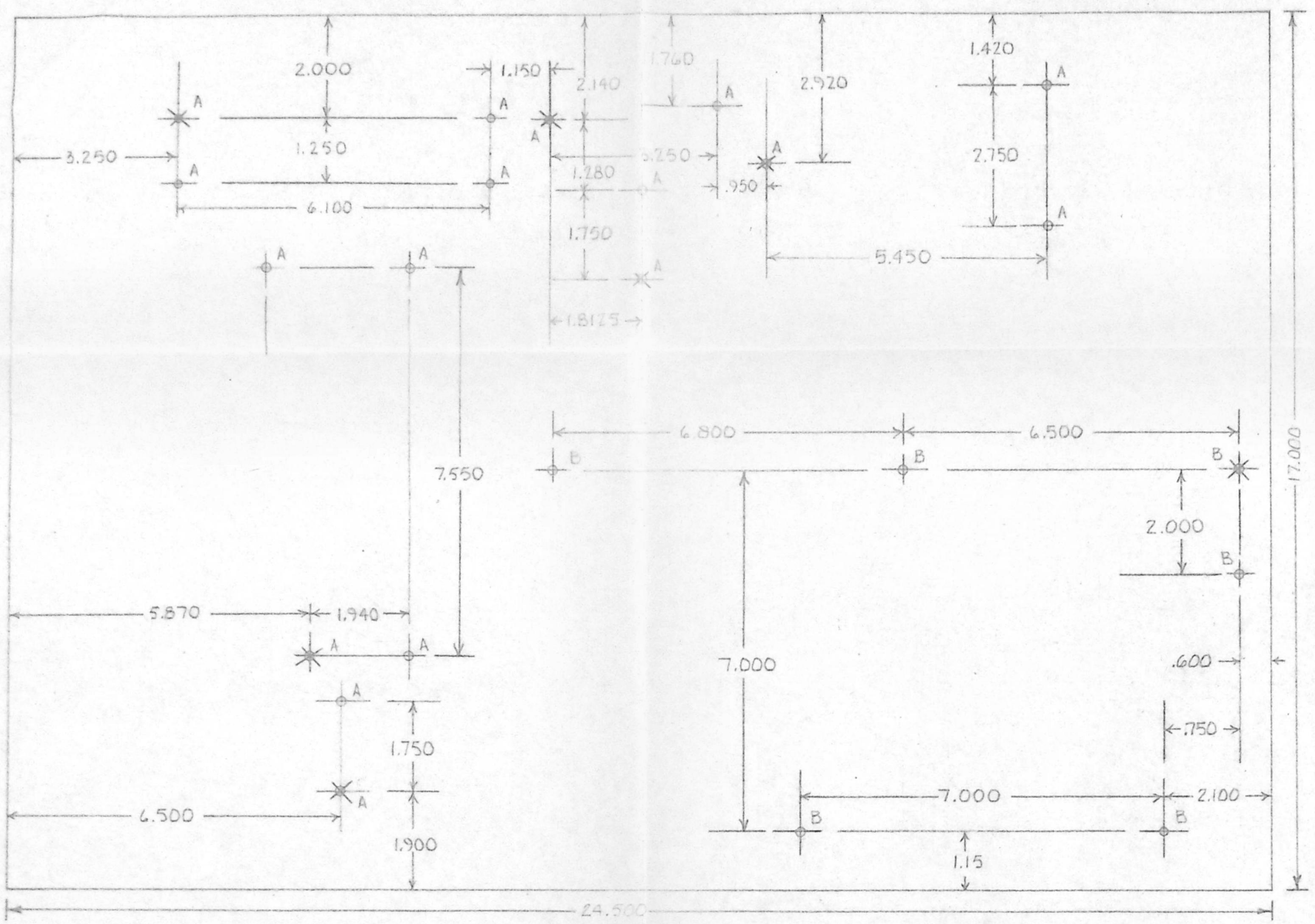
A	.969 X 2.531
B	1.022 X 1.220
C	.250 DIA
D	.750 X 1.141 (±.005 - BOTH)
E	.625 X .625
F	.171 DIA
G	.250 DIA

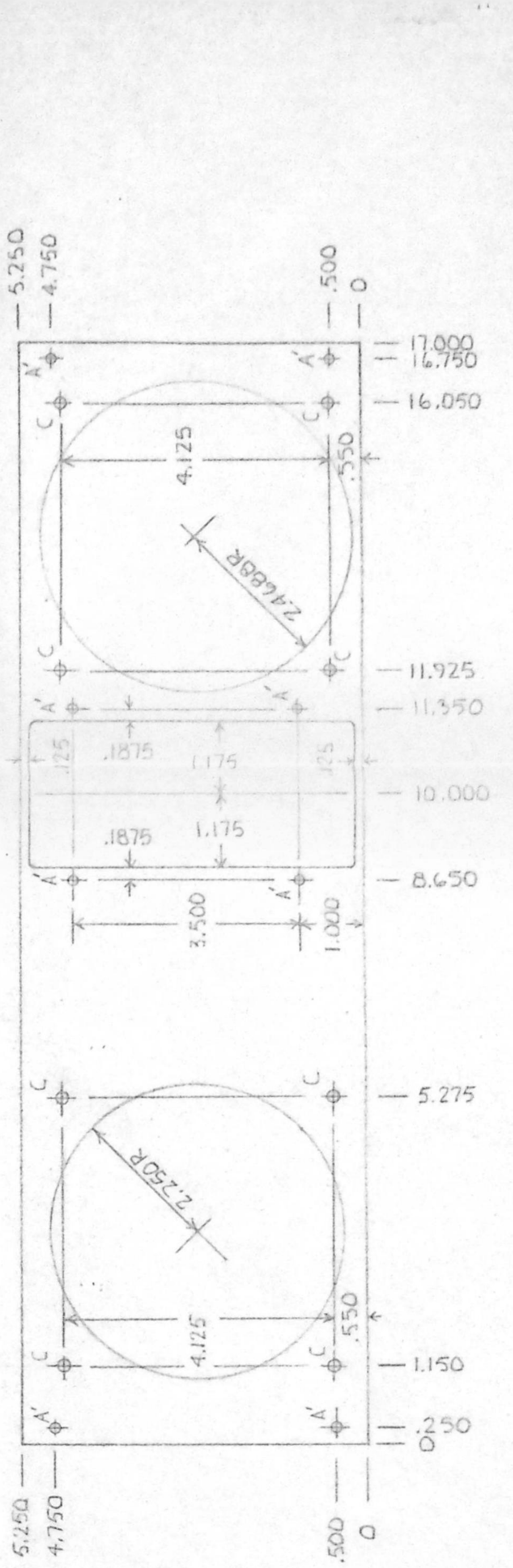
MATL 5052-H32 ALUM X .063 THK
FINISH CLEAR ANODIZE

8/6/81

FRONT PANEL
MAIN POWER SUPPLY

CI-00330 REV A





A .140 DIA CTRSNK FAR SIDE - BASE PLATE ONLY
A' .140 DIA CTRSNK THIS VIEW - REAR PANEL ONLY
B .250 DIA CTRSNK 100° FAR SIDE - BASE PLATE
C .171 DIA THRU - REAR PANEL

MATL - 6061-T651 ALUM X .125 THK
FINISH - CLEAR ANODIZE

BASE PLATE CI-00326
REAR PANEL CI-00328
MAIN POWER SUPPLY

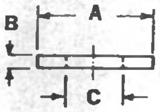
NYLON AND FIBRE WASHERS

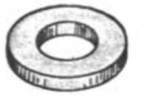
6512

FLAT WASHERS NYLON & FIBRE

AVAILABLE FROM STOCK
We can manufacture many other sizes and materials.

Material:
Fibre, Commercial per Mil-F-1148A, Grade CH
Nylon, Grade 6/6 per MIL-P-20693A

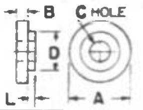




MATERIAL	SCREW SIZE	C I.D.	A O.D.	B THICKNESS		
				.032 Cat. No.	.047 Cat. No.	.062 Cat. No.
FIBRE	#2	.098	.187	3111	3148	3366
			.250	3112	3149	3367
			.312	3113	3150	3194
NYLON	#2	.098	.187	3114	3151	3356
			.250	3347	3152	3357
			.312	3115	3153	3195
FIBRE	#4	.120	.250	3116	3154	3368
			.312	348	3155	3196
			.375	3117	3156	3197
NYLON	#4	.120	.250	3348	345	3358
			.312	3359	3157	3198
			.375	3118	3158	3200
FIBRE	#6	.140	.250	3119	3159	3369
			.312	3120	3160	3370
			.375	3121	3161	3201
NYLON	#6	.140	.250	3122	3162	3360
			.312	3349	346	3361
			.375	3123	3163	3202
FIBRE	#8	.171	.312	3124	3164	3203
			.375	3125	3165	3372
			.437	3126	3166	3204
NYLON	#8	.171	.312	3127	3167	3205
			.375	3350	3168	3363
			.437	3128	3169	3206
FIBRE	#10	.196	.312	349	3170	3207
			.375	3129	3171	3208
			.437	3130	3172	3209
			.500	3131	3173	3210
NYLON	#10	.196	.312	3364	3174	3211
			.375	3352	3175	3212
			.437	3132	3176	3213
			.500	3133	3177	3214
FIBRE	1/4	.260	.437	3134	3178	3215
			.500	3135	3179	3373
			.625	3136	3180	3216
			.750	3137	3181	3217
NYLON	1/4	.260	.437	3138	3182	3218
			.500	3353	3183	3365
			.625	3139	3184	3219
			.750	3140	3185	3220
FIBRE	3/8	.385	.500	3141	3186	3221
			.625	3142	3187	3222
			.750	3143	3188	3223
			1.000	3144	3189	3224
NYLON	3/8	.385	.500	3145	3190	3225
			.625	3354	3191	3226
			.750	3146	3192	3227
			1.000	3147	3193	3228

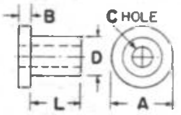
FIBRE SHOULDER WASHERS

Material: Fibre, Commercial per MIL-F-1148A, Grade CH



CAT. NO.	SCREW SIZE	L	A	B	C	D
3229	2	.025	.250	.030	.093	.123
3061	2	.025	.250	.030	.093	.156
344	4	.015	.312	.062	.125	.203
343	4	.025	.312	.062	.125	.203
3062	4	.031	.250	.031	.115	.187
3230	4	.031	.281	.062	.115	.175
3231	4	.031	.312	.062	.120	.180
4698	6	.031	.250	.062	.140	.187
3064	6	.031	.312	.062	.140	.187
3232	6	.031	.375	.062	.140	.210
3233	6	.031	.375	.062	.140	.240
3234	6	.031	.500	.062	.140	.240
3065	8	.031	.375	.062	.170	.246
3066	8	.031	.417	.062	.180	.210
3235	8	.031	.312	.062	.170	.218
3236	8	.031	.375	.062	.170	.215
3237	8	.031	.500	.062	.170	.240
4702	10	.031	.375	.062	.194	.308
3238	10	.031	.375	.062	.194	.240
3239	10	.031	.500	.062	.196	.240
4711	1/4	.031	.500	.062	.253	.308
3240	1/4	.031	.625	.062	.265	.359
3069	3/8	.031	.625	.062	.385	.498
3241	3/8	.031	.750	.062	.385	.498

MOLDED NYLON SHOULDER BUSHINGS



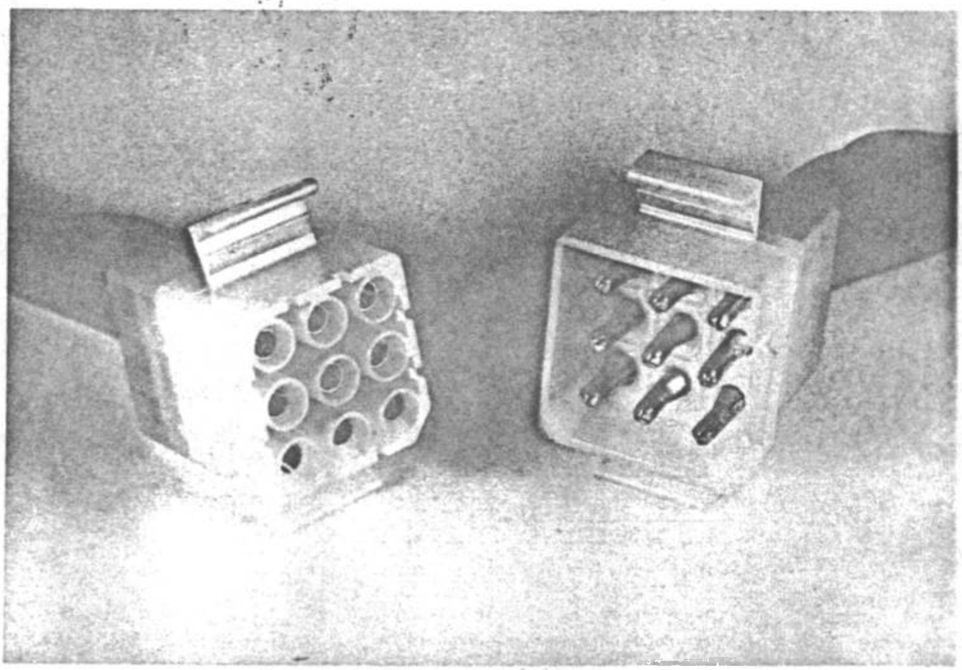
CAT. NO.	SCREW SIZE	L	A	B	C	D
3051	2	.125	.181	.047	.090	.120
3101	2	.187	.181	.047	.090	.120
3052	2	.250	.181	.047	.090	.120
3053	4	.093	.235	.047	.115	.145
3102	4	.125	.235	.047	.115	.145
3103	4	.187	.235	.047	.115	.145
340	4	.250	.235	.047	.115	.145
3054	6	.125	.290	.047	.140	.170
3104	6	.187	.290	.047	.140	.170
341	6	.250	.290	.047	.140	.170
3055	6	.500	.290	.047	.140	.170
3056	8	.140	.344	.062	.171	.205
3105	8	.250	.344	.062	.171	.205
342	8	.375	.344	.062	.171	.205
3106	8	.500	.344	.062	.171	.205
3107	10	.093	.438	.062	.200	.260
3108	10	.250	.399	.062	.200	.260
3057	10	.500	.399	.062	.200	.260
3058	10	.750	.399	.062	.200	.260
3059	1/4	.187	.513	.062	.260	.312
3109	1/4	.250	.513	.062	.260	.312
3110	1/4	.375	.513	.062	.260	.312
3060	1/4	.500	.513	.062	.260	.312

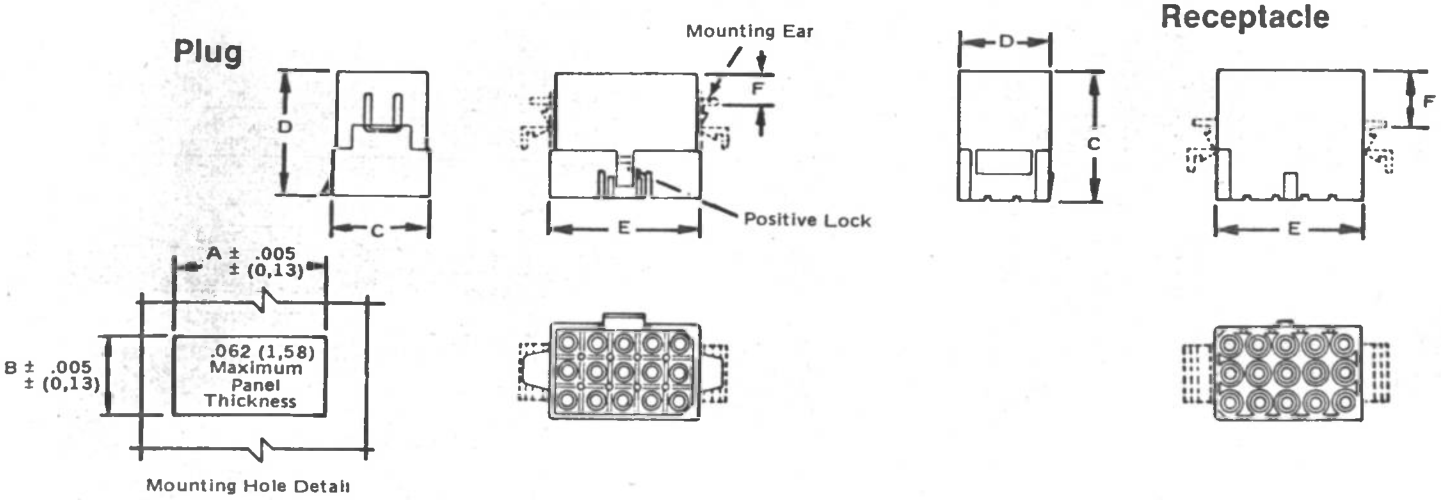
.093" (2,36 mm) Connectors

1991 Series

features/dimensions

- Integrally molded polarization
- 94V-2 rated nylon
- Accept Molex .093" (2,36 mm) crimp type or P.C. tail terminals
- Meet European, Japanese and American specifications
- .25" (6,3 mm) spacing in a grid pattern
- .16" (4 mm) over surface .12" (3 mm) through air spacing between terminals
- .16" (4 mm) spacing between the back of the terminal and the end of the housing
- 3, 4, 6, 9, 12, and 15 circuit versions
- Available with integrally molded mounting ears



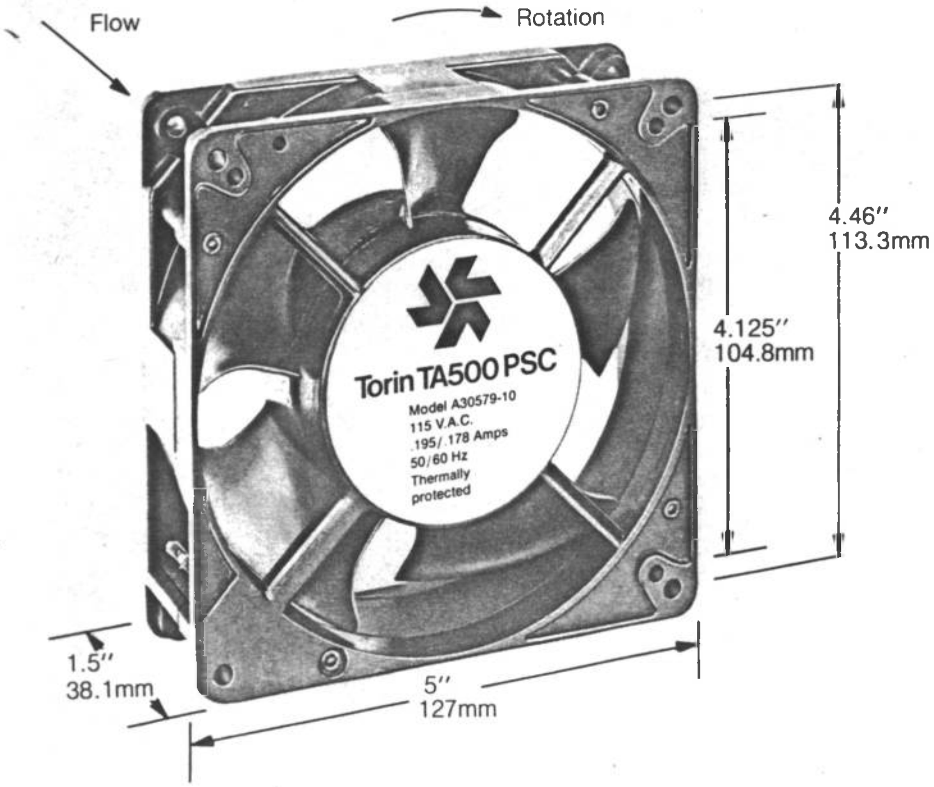


Dimensional Information

Circuits	Model No.	Receptacle Dimensions A	B	C	D	E	F	Plug Dimensions A	B	C	D	E	F
3	1991-3	.920 (23,37)	.310 (7,87)	1.14 (28,95)	.25 (6,35)	.760 (19,30)	.51 (12,95)	1.022 (25,95)	.365 (9,27)	.35 (8,89)	1.100 (27,94)	.862 (21,89)	.52 (13,20)
4	1991-4	1.168 (29,67)	.311 (7,90)	1.14 (28,95)	.25 (6,35)	1.010 (25,65)	.51 (12,95)	1.270 (32,26)	.365 (9,27)	.35 (8,89)	1.100 (27,94)	1.110 (28,19)	.52 (13,20)
6	1991-6	.946 (24,03)	.608 (15,44)	1.14 (28,95)	.54 (13,67)	.79 (20,06)	.54 (13,70)	1.048 (26,62)	.658 (16,71)	.64 (16,25)	1.100 (27,94)	.886 (22,50)	.52 (13,20)
9	1991-9	.946 (24,03)	.850 (21,59)	1.14 (28,95)	.79 (20,06)	.79 (20,06)	.54 (13,70)	1.048 (26,62)	.910 (23,11)	.89 (22,60)	1.100 (27,94)	.886 (22,50)	.52 (13,20)
12	1991-12	1.194 (30,33)	.850 (21,59)	1.14 (28,95)	.79 (20,06)	1.034 (26,26)	.54 (13,70)	1.300 (33,02)	.910 (23,11)	.89 (22,60)	1.100 (27,94)	1.14 (28,95)	.31 (7,87)
15	1991-15	1.442 (36,63)	.850 (21,59)	1.14 (28,95)	.79 (20,06)	1.282 (32,56)	.54 (13,70)	1.552 (39,42)	.910 (23,11)	.89 (22,60)	1.100 (27,94)	1.388 (35,26)	.31 (7,87)

Dimensional and Mounting Details

The TA500PSC may be mounted directly to a panel from either face using four .180″ (4.57mm) diameter holes, 4.46″ (113.3mm) on centers with four #8 screws and nuts or #10 threadforming screws. It may also be mounted using three .156″ (3.96mm) diameter holes, 4.125″ (105mm) on centers with three #6 screws and nuts, or #8 threadforming screws. This latter mounting is interchangeable with present four and one half inch fans.

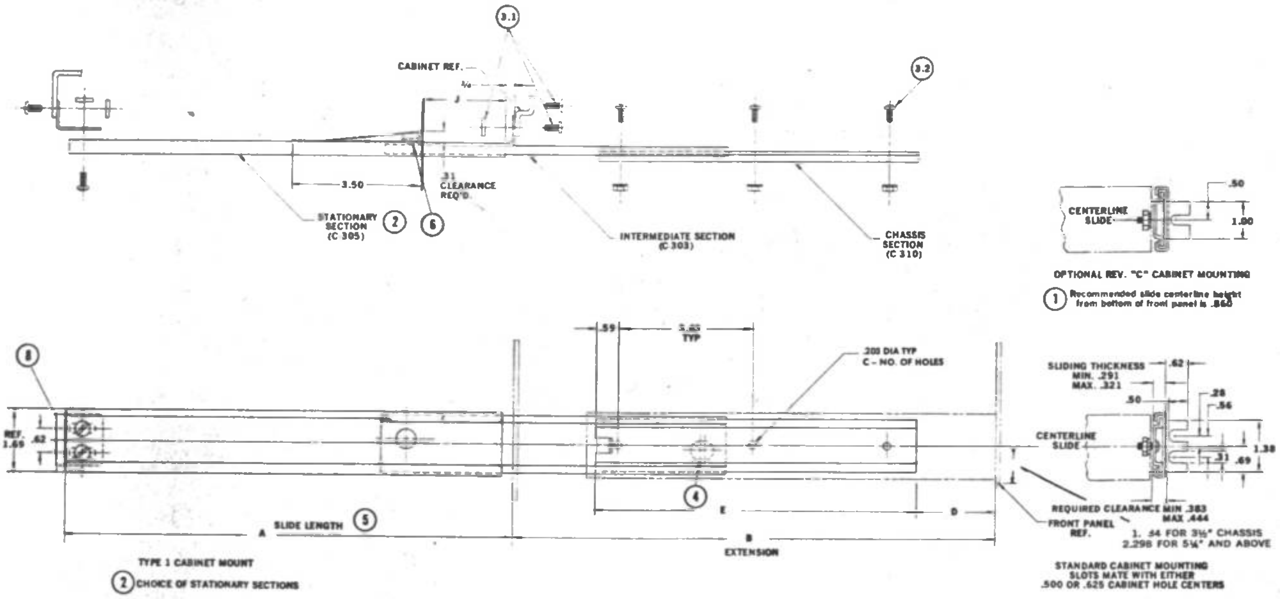


C-300 SERIES

STOCK SLIDE DIMENSIONS

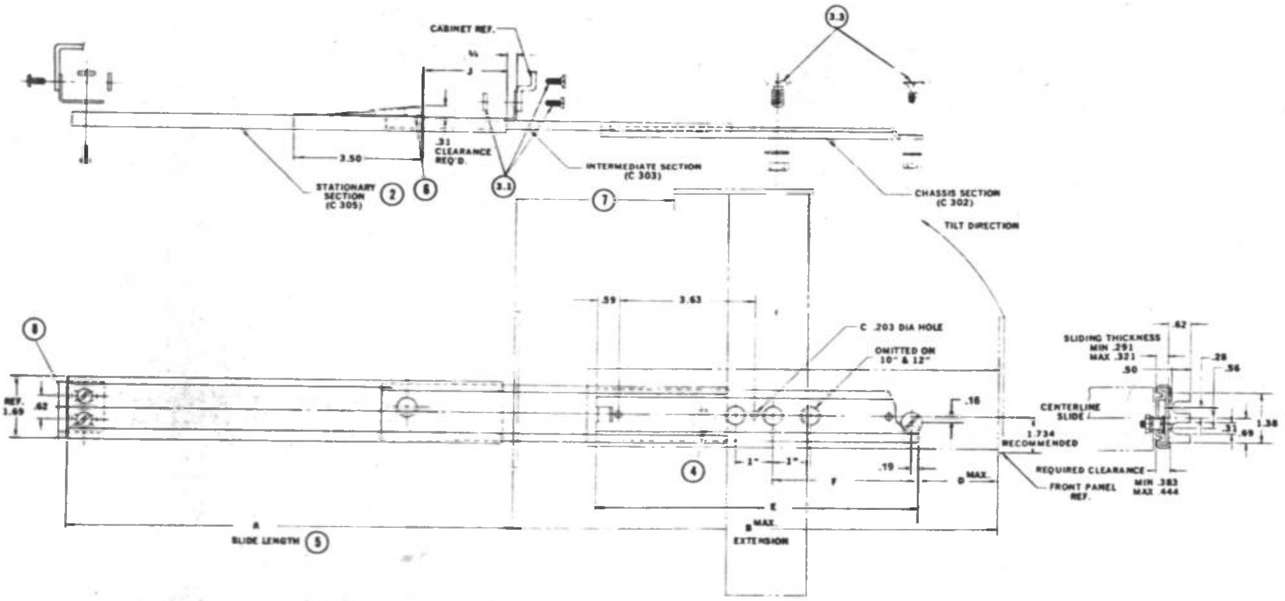
A Slide Length	B Maximum Extension	C No. of Holes	D Maximum	E	F	G Maximum	H	J
10	11	3	1/8	8 5/8	3 29/32			2 3/16
12	13	3	2 1/8	8 5/8	3 29/32	5 1/4	5 1/2	2 3/16
14	15	4	1/8	12 5/8	6 9/16	5 1/4	7 1/2	4 3/16
16	17	4	2 1/8	12 5/8	6 9/16	7 1/4	7 1/2	4 3/16
18	19	4	4 1/8	12 5/8	6 9/16	9 1/4	7 1/2	4 3/16
20	21	5	1/8	18 5/8	8 7/8	5 1/4	13 1/2	7 3/16
22	23	5	2 1/8	18 5/8	8 7/8	7 1/4	13 1/2	7 3/16
24	25	5	4 1/8	18 5/8	8 7/8	9 1/4	13 1/2	7 3/16

MODEL C-300-S NON-PIVOTING SLIDE



3.1
3.2
CABINET REF.
3/4
J
3.50
.31 CLEARANCE REQ'D.
STATIONARY SECTION (C 305) ② ⑥
INTERMEDIATE SECTION (C 303)
CHASSIS SECTION (C 310)
.50
CENTERLINE SLIDE
1.00
OPTIONAL REV. "C" CABINET MOUNTING
① Recommended slide centerline height from bottom of front panel is .860
⑧
.59
3.63 TYP
.203 DIA TYP C - NO. OF HOLES
REF. 1.69
.62
④
E
D
A SLIDE LENGTH ⑤
B EXTENSION
SLIDING THICKNESS MIN. .291 MAX. .321
.62
.50
.28
.56
CENTERLINE SLIDE
1.38
.31
.69
REQUIRED CLEARANCE MIN .383 MAX .444
FRONT PANEL REF.
1. .84 FOR 3½" CHASSIS 2.298 FOR 5¼" AND ABOVE
STANDARD CABINET MOUNTING SLOTS MATE WITH EITHER .500 OR .625 CABINET HOLE CENTERS
TYPE 1 CABINET MOUNT
② CHOICE OF STATIONARY SECTIONS

MODEL C-300-B PIVOTING (UP) SLIDE



STANDARD POWER SUPPLIES

STANDARD POWER, INCORPORATED ■ 1400 South Village Way ■ Santa Ana, Calif. 92705 ■ phone (714) 558-8512

SCHEMATIC REQUEST

NAME: GlEN HILL

COMPANY: COMPUTER IMAGES

ADDRESS: 2475 West 2nd Ave

CITY, STATE: Denver, Colorado 80223

DATE REQUESTED: 3/20/81

DATE MAILED: 3/25

(303)934-5801

REQUESTED BY:

ANDIE SMOLANOVICH

SCHEMATIC NO.: 1A 30BT9/18/18 104880
10A CPS 500-5-91 1014984
2A SPS 60D-5/12/OVP 101725-11
3A SPS90D-12/15 ~~w/OVP~~ 1019871
W/ 20 VP-1's

AA SPS 80T 5/12/15-97 102091-1-11
1A SPS 15-5-91 - 300921-11
AA SLS 62-24-91 - 301333-01
AA SLS 92-5/OV - 104531
2A SLS 42-15-91 - 104474-01
1A SLS 32-24-91 - 104698-01

REPRESENTATIVE:

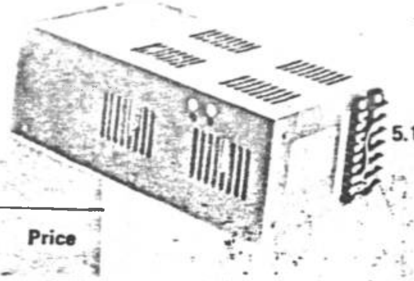
LINDA K. CANDLER

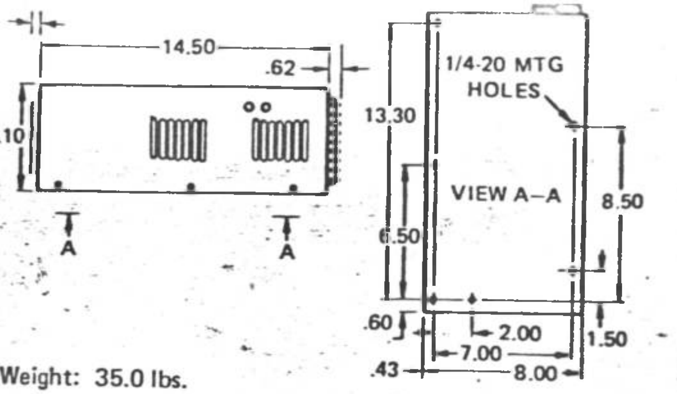
CPS 500

Fan-Cooled
(47-63 Hz)

Remote Sensing

Model Number	Nom. Vdc	Max. Amps	Price
CPS 500-5	5	50	$375.00

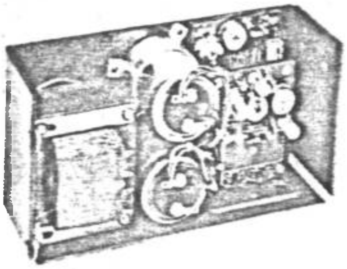


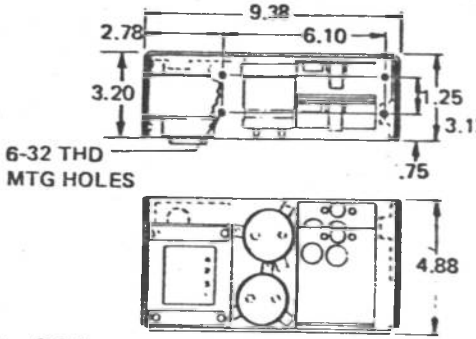


Weight: 35.0 lbs.

SPS 90D SERIES

Model Number	Nom. Vdc	Max. Amps	Price
SPS 90D-12/15†	12–15 12–15	3 3	98.00

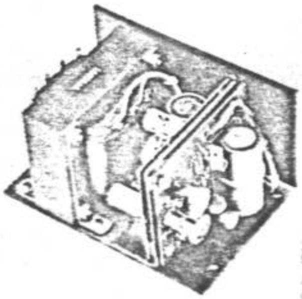


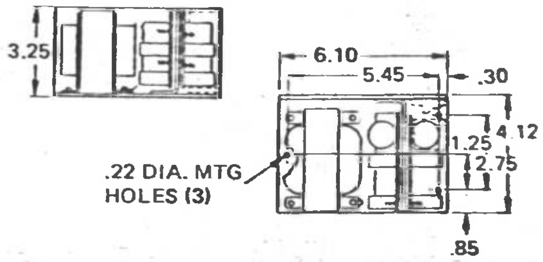


Weight: 8.0 lbs.

SPS 60D SERIES

Model Number	Nom. Vdc	Max. Amps	Price
SPS 60D-5/12	5 10–12	3 1.5/1.8	$79.00



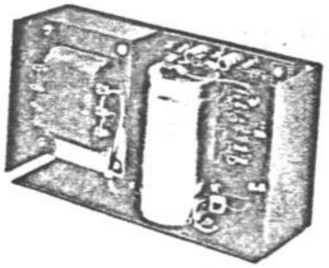


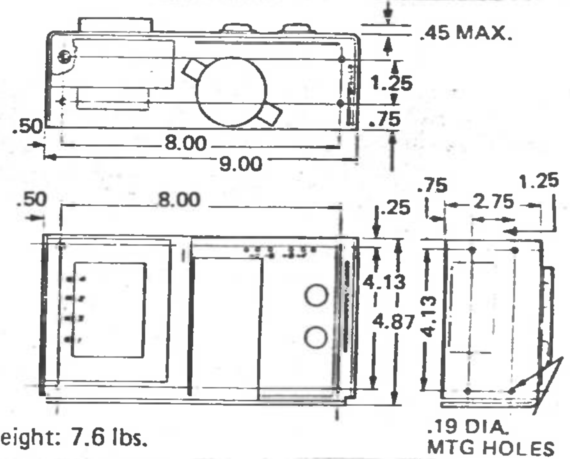
Weight: 5.8 lbs.

SLS 92 SERIES

Remote Sensing

Model Number	Vdc	Amps	Unit Price
SLS 92-5	5	12.0	$94.00



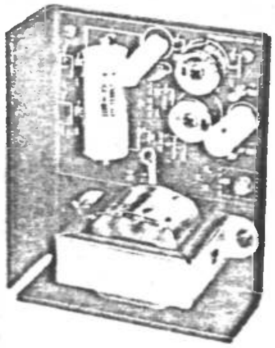


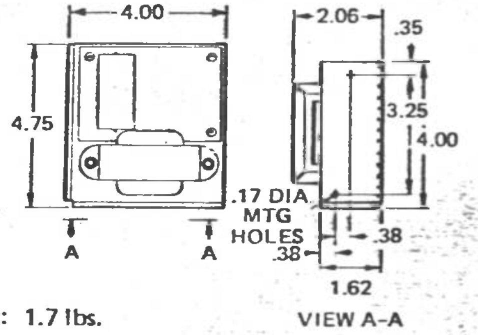
Weight: 7.6 lbs.

All Dimensions in Inches.

SPS 15 SERIES

Model Number	Nom. Vdc	Max. Amps	Price
SPS 15-5	5	1.5	$26.00





Weight: 1.7 lbs.

STANDARD
POWER
SUPPLIES

INSTRUCTION SHEET

SPS/CPS SERIES

FEATURES

- Voltage adjustment potentiometer
- Foldback current limiting
- 115/230 Vac, 47-440 Hz input
- 0.1% line/load regulation
- Temperature compensated circuitry
- 0.1% ripple
- Optional overvoltage protection
- Optional square current limiting
- Optional logic inhibit

DESCRIPTION

The SPS and CPS Series are series regulated, solid state power supplies designed to provide closely regulated DC voltages in all popular voltage and current levels. The output is floating, hence any voltage may be plus or minus or referenced to another voltage.

OPERATING PROCEDURE

For 115 Vac, 47-440Hz connect input leads to terminals 1 and 4 of transformer or input terminal block, terminals 1 & 3 and 2 & 4 will be jumpered. (Factory connection)

For 230 Vac input, remove jumpers between 1 & 3 and 2 & 4. Then jumper terminals 2 and 3 together and connect 230 Vac to terminals 1 and 4. Suggest twisted AC input wires if electrical noise reduction is prime concern.

Output terminals identified in figures on back of this sheet are marked + and -. Load should be connected to these terminals with due care to proper wire size and solid electrical connection for best results. Output voltages may be adjusted with the potentiometers identified in the figures located on the back of this sheet

SUGGESTED TEST PROCEDURE

Connect AC input power as outlined in operating procedure. Place a variac between Vac source and input to transformer. Place an AC voltmeter across transformer input terminals 1 and 4. Set input voltage for nominal 115 Vac with variac.

Place resistive load across output, check Vdc output specifications. DC voltmeter should be connected directly across output terminals. Greatest test errors are made at this point.

LINE REGULATION

With output adjusted to rated voltage, reduce input Vac to 104 volts and record or note output voltage. Then increase input Vac. to 126 Vac and note output voltage. Total output voltage change should not exceed .2% or ± .1%.

LOAD REGULATION

Set AC input voltage to 115 Vac. Place DC voltmeter across output terminals and record or note output voltage. A load resistor, equal to the rated load of the supply at selected DC voltage setting, is then applied to output terminals. The voltage change should be noted. This differential change should not exceed .2% or ± .1% of DC output voltage.

Output current adjust is accomplished by placing a load resistor of the desired value across output terminal; adjust current limit potentiometer identified in figures on back of this sheet until voltage starts to drop. This is the fold back point of current limiting, this control is factory set to 120% of rated output and sealed.

RIPPLE

With voltage set at 115 volts and full load across DC output terminals, the measurable AC voltage on output should not exceed 0.1% RMS.

◂ OVERVOLTAGE PROTECTION

Optional overvoltage protection is available on most models. Consult the catalog selection guide or the listing on the next page for appropriate models or contact the factory for application note.

Loads generating high back EMF voltages should be checked with parallel diode, zener, or series diode to reduce detrimental effects on pass elements. It is recommended that the AC input circuit be fused. A suggested fuse rating is listed on the reverse side of this sheet.

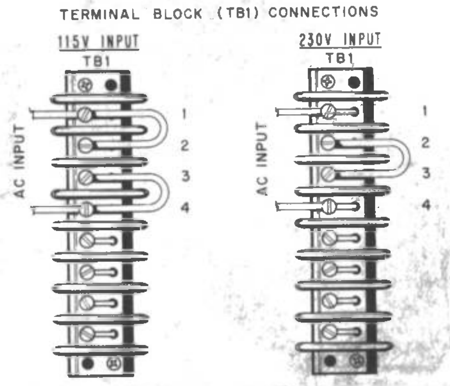
SUGGESTED PRACTICES

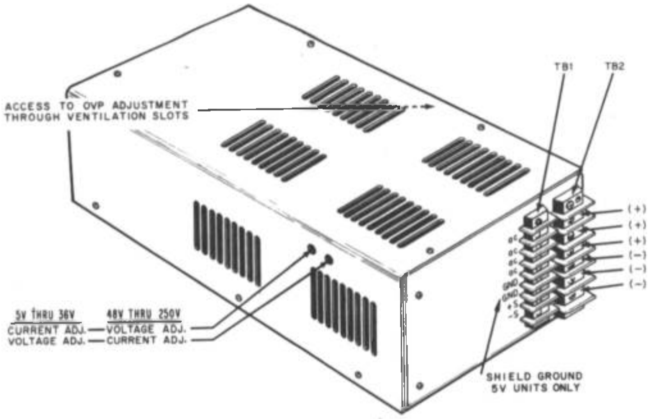
Moving air is desireable when mounting in a confined area. Chassis may be attached to other heat dissipating surfaces to improve cooling characteristic at maximum ratings.

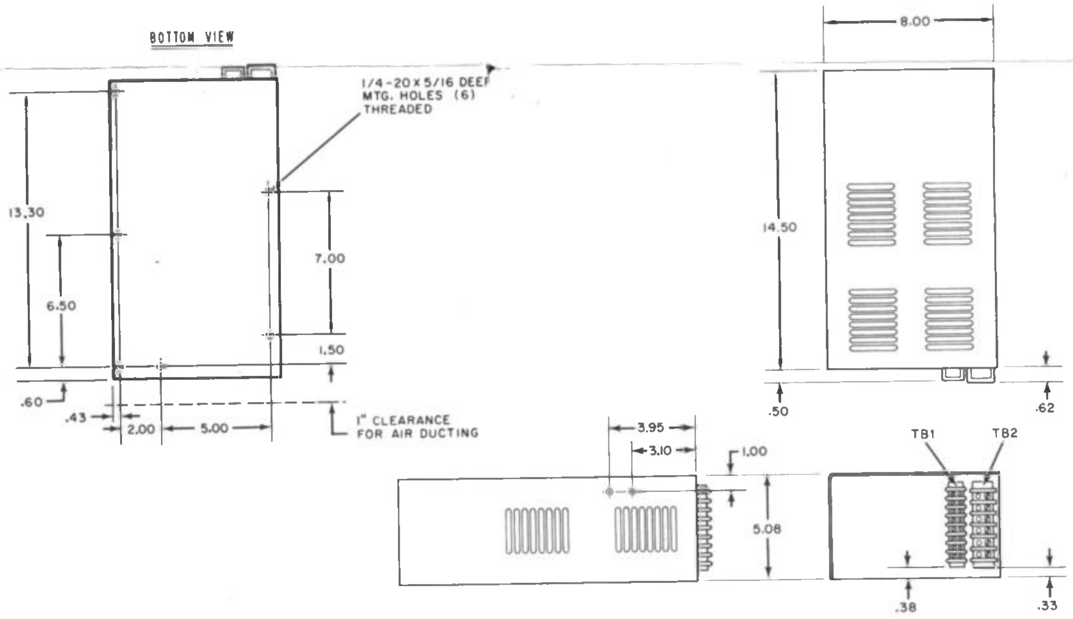
CPS 500 SERIES

NOTES:

1. All CPS 500 series power supplies are internally fused and thermal overload protected. In the event of excessive internal temperatures, the thermal sensor interrupts the transformer primary circuit. When the internal temperatures return to normal the thermal sensor will automatically reset and restore power supply operation. The internal fuses are rated at 5A, 3AG.
2. Remote sensing capability is provided on all models. Factory installed jumpers on the output terminal block are provided for the local sense mode.
3. Factory installed jumpers on the input terminal block are provided for 115 or 230 volt operation. Units are shipped with 115 volt jumper arrangement unless otherwise specified.
4. OVP-4 is compatible with 5 volt through 28V models. OVP-14 may be used on 5 volt units only.







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INSTRUCTION SHEET

SPS 60D 12/15 DUAL OUTPUT SUPPLY

Description: The SPS 60D 12/15 Series is a series regulated, solid state power supply designed to provide adequately regulated dual DC voltages. Each output is continuously adjustable between 12 and 15 VDC. The output is 12/15 Vdc at 1.8 amps and 12/15 Vdc at 1.8 amps. A common may be connected between the supplies to permit either polarity, i.e., the supplies may be connected +12/15V, +12/15V; +12/15V -12/15V, etc.

Features:
- Dual Output + and -
- Voltage adjust pot
- 115/230 Vac input, 50/60 Hz operation
- Short circuit protection, fold back type
- 0.1% line/load regulation
- Temperature compensated circuitry
- 0.1% ripple
- Optional overvoltage protection

Operating Procedure: Connect 115 Vac, 50/60 Hz to terminals 1 and 4 of transformer. (Terminals 1 & 3 are jumpered and 2 & 4 are jumpered.)

For 220 Vac input, remove jumpers between 1 & 3 and 2 & 4. Then jumper terminals 2 and 3 together and connect 220 Vac to terminals 1 and 4. Suggest twisted AC input wires if electrical noise reduction is prime concern.

Output terminals are located on printed circuit board and are marked +, common, and -. Load should be soldered to these terminals with due care to proper wire size and solid electrical connection for best results.

Suggested Test Procedure: Connect AC input power as outlined in operating procedure. Place a variac between Vac source and input to transformer. Place an AC voltmeter across transformer input terminals 1 and 4. Set input voltage for nominal 115 Vac with variac.

Place resistive load across output, check Vdc output specifications. DC voltmeter should be connected directly across output terminals. Greatest test errors are made at this point. DC voltmeter leads must be kept short and connections as solid as possible. Resistive drops in test leads cause regulation errors. Output voltage may require adjustment. This can be accomplished by pot located on each printed circuit board. See attached sketch for location.

Line Regulation: With output voltage set at proper voltage (depending on model), reduce input Vac to 104 volts and record or note output voltage. Then increase input Vac to 126 Vac and note output voltage. Total output voltage change should not exceed .2% or ± .1%. Test each side separately.

Load Regulation: Set AC input voltage to 115 Vac. Place DC voltmeter across output terminals. A load resistor, equal to the rated load of this supply at selected DC voltage setting, is then applied to output terminals. The voltage change should be noted. This differential change should not exceed .2% or ± .1% of DC output voltage. Test each side separately.

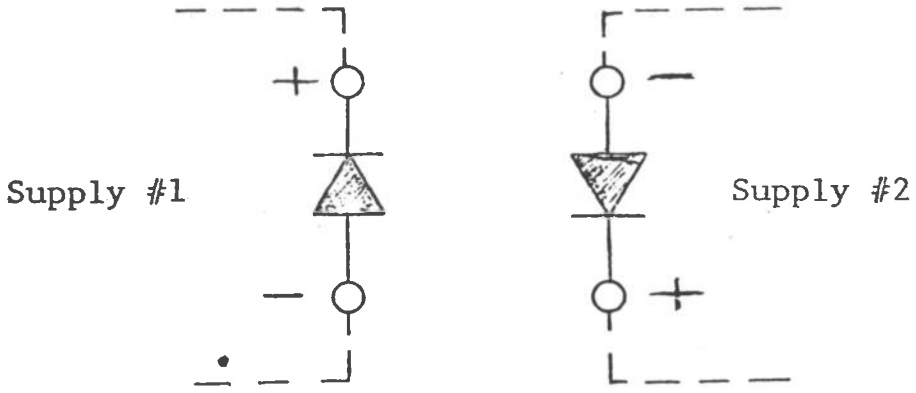
Ripple: With voltage set at 115 volts and full load across DC output terminals, the measurable AC voltage on output should not exceed 0.1% Test each side separately.

Suggested Practices: It is not required; however, chassis should be attached to other heat dissipating surfaces if full power over extended periods is desired.

Loads generating high back EMF voltages should be checked with zener or series diode to reduce detrimental effects on pass elements.

Optional OVP: The OVP may be connected in two ways.

1. An individual OVP may be connected across each outpu
2. If the supply outputs are connected so that the output is + and -, one OVP may be connected across the total + and - output if a 3 amp diode is connected across each set of output terminals.as shown below.



STANDARD
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INSTRUCTION SHEET
SPS/CPS SERIES MULTIPLE OUTPUT

FEATURES

- Voltage adjustment potentiometer
- Foldback current limiting
- 115/230 Vac, 47-440 Hz input
- .1% line/load regulation
- Temperature compensated circuitry
- 0.1% ripple
- Optional overvoltage protection
- Optional square current limiting

DESCRIPTION

The SPS and CPS Series are series regulated, solid state power supplies designed to provide closely regulated DC voltages in all popular voltage and current levels. The outputs are floating, so any voltage may be plus or minus or referenced to another voltage.

OPERATING PROCEDURE

For 115 Vac, 47-440Hz connect input leads to terminals 1 and 4 of transformer or input terminal block, terminals 1 & 3 and 2 & 4 will be jumpered. (Factory connection)

For 230 Vac input, remove jumpers between 1 & 3 and 2 & 4. Then jumper terminals 2 and 3 together and connect 230 Vac to terminals 1 and 4. Suggest twisted AC input wires if electrical noise reduction is prime concern.

Output terminals identified in figure 3 on back of this sheet are marked + and -. Load should be connected to these terminals with due care to proper wire size and solid electrical connection for best results. Output voltages may be adjusted with the potentiometers identified in the tabulation block on the back of this sheet (Figure 2).

SUGGESTED TEST PROCEDURE

Connect AC input power as outlined in operating procedure. Place a variac between Vac source and input to transformer. Place an AC voltmeter across transformer input terminals 1 and 4. Set input voltage for nominal 115 Vac with variac.

Place resistive loads across outputs, check Vdc output specifications. DC voltmeter should be connected directly across output terminals. Greatest test errors are made at this point.

LINE REGULATION

With outputs adjusted to rated voltages, reduce input Vac to 104 volts and record or note output voltage. Then increase input Vac. to 126 Vac and note output voltage. Total output voltage change should not exceed .2% or ± .1%.

LOAD REGULATION

Set AC input voltage to 115 Vac. Place DC voltmeter across output terminals and record or note output voltage. A load resistor, equal to the rated load of each output, at selected DC voltage setting, is then applied to output terminals. The voltage change should be noted. This differential change should not exceed .2% or ± .1% of DC output voltage.

RIPPLE

With voltage set at 115 volts and full load across DC output terminals, the measurable AC voltage on output should not exceed 0.1% RMS.

OVERVOLTAGE PROTECTION

Optional overvoltage protection (OVP) is available on most models. Consult the catalog selection guide or the listing on next page for appropriate models or contact the factory for application note. When installing OVP across two series connected outputs, observe cautionary note on reverse side of this sheet.

SUGGESTED PRACTICES

Moving air is desireable when mounting in a confined area. Chassis may be attached to other heat dissipating surfaces to improve cooling characteristic at maximum ratings. Loads generating high back EMF voltages should be checked with zener, parallel diode, or series diode to reduce detrimental effects on pass elements. It is recommended that the AC input circuit be fused. A suggested fuse rating is listed on the reverse side of this sheet.

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NOTES:

1. Recommended input fuse 3A, 3AG.
2. Two OVP-1's may be used with 5V through 28V models.
3. If one OVP is used to protect two series connected outputs, it is necessary to install 6 amp diodes across each output as shown in figure 1.

   The sum of the series connected outputs must be less than 32 volts.
4. OVP-0 or OVP-11 may be used on 5V outputs only.
5. If problems are encountered in series operation of two outputs powering a common load, contact the factory for application note AN 101.
6. For 12/15 volt outputs only:

   This power supply is equipped with transformer taps for 12 volt and 15 volt operation. Factory connection of the 15 volt taps is standard procedure. If 12 volt operation is required, the 12 volt taps should be used to prevent excessive thermal dissipation at full load operation. Transformer must be removed for reconnection of taps, reconnection of taps is shown below.

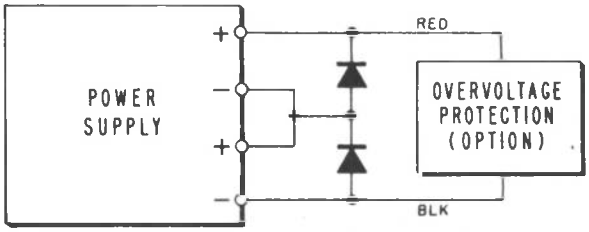
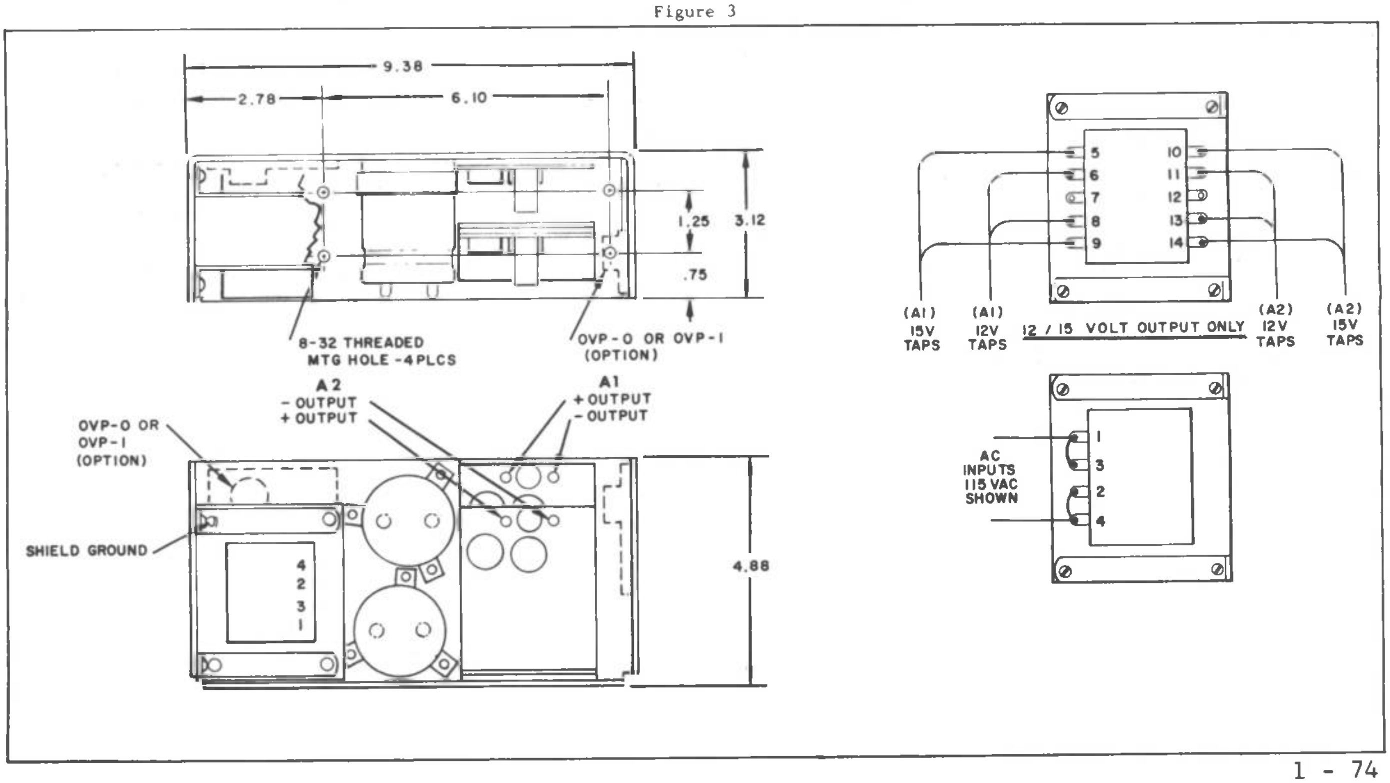


Figure 1

LOCATION	A 1	A 2
OUTPUT **VOLTAGE ADJ** **CURRENT LIMIT ADJ**	5V, 6A R14 R6	10/12V, 2.5/3.0A R10 R2
OUTPUT **VOLTAGE ADJ** **CURRENT LIMIT ADJ**	12/15V, 3/3A R10 R2	12/15V, 3/3A R10 R2
OUTPUT **VOLTAGE ADJ** **CURRENT LIMIT ADJ**		

Figure 2

Figure 3



STANDARD
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OVERVOLTAGE PROTECTION

CROWBAR

DESCRIPTION

The overvoltage protection (OVP) is a device designed to protect against undesirable overvoltage conditions, which may occur due to power supply regulation, or power distribution malfunction.

CIRCUIT THEORY

A voltage reference is established by a zener in series with a divider network placed in shunt across DC output of power source. The zener reference voltage is amplified through a transistor stage connected to a SCR gate. The SCR is shunted across the output of the DC source.

THEORY OF OPERATION

When the source voltage rises above the preset threshold level, the SCR is triggered on causing what appears to be a short across the DC source, thereby reducing the DC source voltage to near zero.

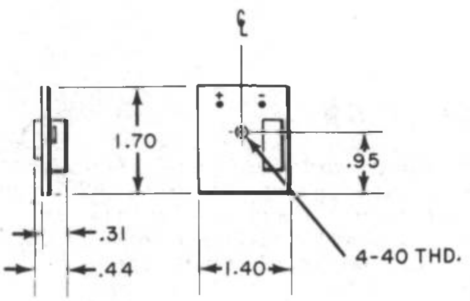
APPLICATION

The OVP leads are placed red to + Vdc and black to - Vdc of power supply output. The voltage adjust pot on OVP printed circuit board is turned counterclockwise to its stop (facing component side of printed circuit board). The desired trip point of overvoltage is set on Vdc output of supply. Then the pot on the OVP is turned clockwise until the OVP fires or crowbars. Turn off the DC supply and re-adjust power supply to desired operating voltage. The OVP will recover or reset automatically when DC voltage is turned off and the capacitors have discharged. If difficulty is experienced in adjusting the power supply output to the desired OVP firing point, contact the factory for application note (AN 105). An auxillary power supply should not be used to trigger the OVP unless the OVP is disconnected from the power supply under test. Failure to disconnect the OVP before the auxillary supply is connected may damage the power supply. Fusing of primary or secondary of power supply is recommended to avoid damage to supply in the event that regulator is shorted when the OVP is actuated. Suggested primary fuse values are listed on the instruction sheet of each power supply model. Fuse type 3 AG or 3 AB are recommended.

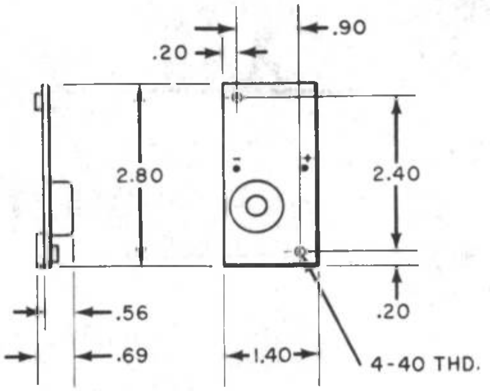
	OVP-0		
TRIGGER VOLTAGE RANGE	6.5 Vdc ± 5%		
CONTINUOUS SHUNT CURRENT	8 Amps Max.		
INSTANTANEOUS SHUNT CURRENT	80 Amps Max.		
	OVP-1	**OVP-11**	**OVP-21**
ADJUSTABLE VOLTAGE RANGE	5.35 - 32 Vdc	5 - 8 Vdc	25 - 75 Vdc
CONTINUOUS SHUNT CURRENT	8 Amps Max.	8 Amps Max.	8 Amps Max.
INSTANTANEOUS SHUNT CURRENT	80 Amps Max.	80 Amps Max.	80 Amps Max.
	OVP-2	**OVP-12**	**OVP-22**
ADJUSTABLE VOLTAGE RANGE	5.35 - 32 Vdc	5 - 8 Vdc	25 - 75 Vdc
CONTINUOUS SHUNT CURRENT	16 Amps Max.	16 Amps Max.	16 Amps Max.
INSTANTANEOUS SHUNT CURRENT	240 Amps Max.	240 Amps Max.	240 Amps Max.
	OVP-3	**OVP-13**	**OVP-23**
ADJUSTABLE VOLTAGE RANGE	5.35 - 32 Vdc	5 - 8 Vdc	25 - 75 Vdc
CONTINUOUS SHUNT CURRENT	35 Amps Max.	35 Amps Max.	35 Amps Max.
INSTANTANEOUS SHUNT CURRENT	450 Amps Max.	450 Amps Max.	450 Amps Max.
	OVP-4	**OVP-14**	**OVP-24**
ADJUSTABLE VOLTAGE RANGE	5.35 - 32 Vdc	5 - 8 Vdc	25 - 75 Vdc
CONTINUOUS SHUNT CURRENT	60 Amps Max.	60 Amps Max.	60 Amps Max.
INSTANTANEOUS SHUNT CURRENT	1000 Amps Max.	1000 Amps Max.	1000 Amps Max.
	OVP-5	**OVP-15**	**OVP-25**
ADJUSTABLE VOLTAGE RANGE	5.35 - 32 Vdc	5 - 8 Vdc	25 - 75 Vdc
CONTINUOUS SHUNT CURRENT	80 Amps Max.	80 Amps Max.	80 Amps Max.
INSTANTANEOUS SHUNT CURRENT	1000 Amps Max.	1000 Amps Max.	1000 Amps Max.

PHYSICAL CHARACTERISTICS

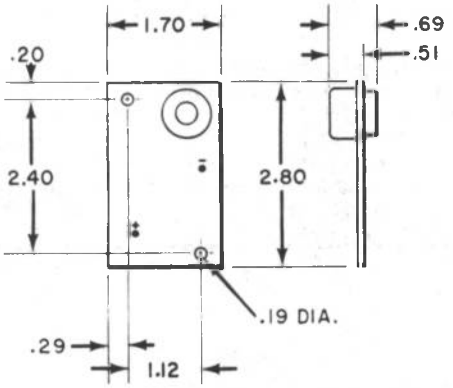
OVP - 0



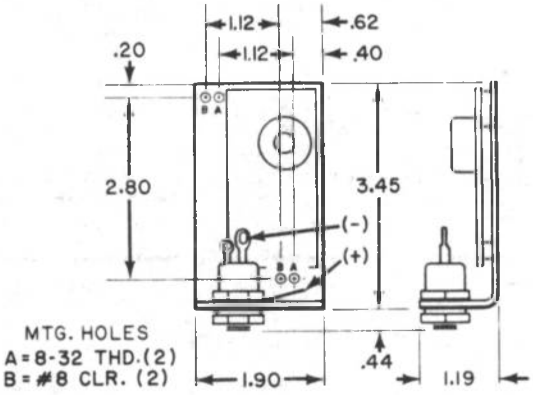
OVP - 1 or 11 or 21



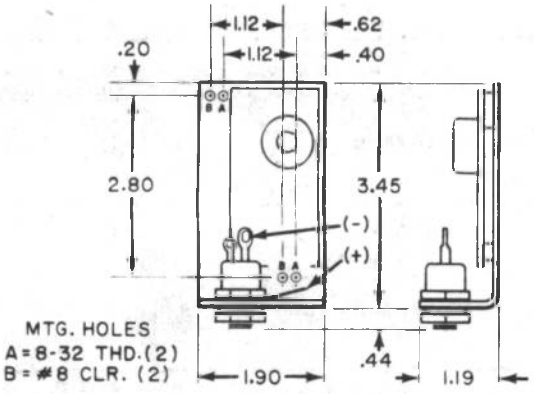
OVP - 2 or 12 or 22



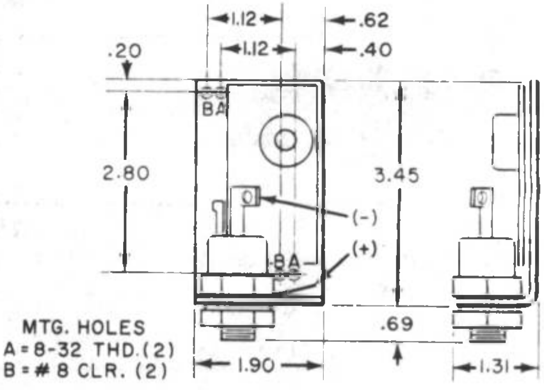
OVP - 3 or 13 or 23



OVP - 4 or 14 or 24



OVP - 5 or 15 or 25



NOTES:

1. All dimensions in inches
2. Typical voltage adjustment
   (component side of PC board)
   CW......6.0 Volts
   CCW.....30 Volts

STANDARD
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INSTRUCTION SHEET

SPS/CPS SERIES MULTIPLE OUTPUT

FEATURES

- Voltage adjustment potentiometer
- Foldback current limiting
- 115/230 Vac, 47-440 Hz input
- .1% line/load regulation
- Temperature compensated circuitry
- 0.1% ripple
- Optional overvoltage protection
- Optional square current limiting

DESCRIPTION

The SPS and CPS Series are series regulated, solid state power supplies designed to provide closely regulated DC voltages in all popular voltage and current levels. The outputs are floating, so any voltage may be plus or minus or referenced to another voltage.

OPERATING PROCEDURE

For 115 Vac, 47-440Hz connect input leads to terminals 1 and 4 of transformer or input terminal block, terminals 1 & 3 and 2 & 4 will be jumpered. (Factory connection)

For 230 Vac input, remove jumpers between 1 & 3 and 2 & 4. Then jumper terminals 2 and 3 together and connect 230 Vac to terminals 1 and 4. Suggest twisted AC input wires if electrical noise reduction is prime concern.

Output terminals identified in figure 3 on back of this sheet are marked + and -. Load should be connected to these terminals with due care to proper wire size and solid electrical connection for best results. Output voltages may be adjusted with the potentiometers identified in the tabulation block on the back of this sheet (Figure 2).

SUGGESTED TEST PROCEDURE

Connect AC input power as outlined in operating procedure. Place a variac between Vac source and input to transformer. Place an AC voltmeter across transformer input terminals 1 and 4. Set input voltage for nominal 115 Vac with variac.

Place resistive loads across outputs, check Vdc output specifications. DC voltmeter should be connected directly across output terminals. Greatest test errors are made at this point.

LINE REGULATION

With outputs adjusted to rated voltages, reduce input Vac to 104 volts and record or note output voltage. Then increase input Vac. to 126 Vac and note output voltage. Total output voltage change should not exceed .2% or ± .1%.

LOAD REGULATION

Set AC input voltage to 115 Vac. Place DC voltmeter across output terminals and record or note output voltage. A load resistor, equal to the rated load of each output, at selected DC voltage setting, is then applied to output terminals. The voltage change should be noted. This differential change should not exceed .2% or ± .1% of DC output voltage.

RIPPLE

With voltage set at 115 volts and full load across DC output terminals, the measurable AC voltage on output should not exceed 0.1% RMS.

OVERVOLTAGE PROTECTION

Optional overvoltage protection (OVP) is available on most models. Consult the catalog selection guide or the listing on next page for appropriate models or contact the factory for application note. When installing OVP across two series connected outputs, observe cautionary note on reverse side of this sheet.

SUGGESTED PRACTICES

Moving air is desireable when mounting in a confined area. Chassis may be attached to other heat dissipating surfaces to improve cooling characteristic at maximum ratings. Loads generating high back EMF voltages should be checked with zener, parallel diode, or series diode to reduce detrimental effects on pass elements. It is recommended that the AC input circuit be fused. A suggested fuse rating is listed on the reverse side of this sheet.

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NOTES:

1. Recommended input fuse 3A, 3AG.
2. Two OVP-1's may be used with 5V through 28V models.
3. If one OVP is used to protect two series connected outputs, it is necessary to install 6 amp diodes across each output as shown in figure 1.

   The sum of the series connected outputs must be less than 32 volts.
4. OVP-0 or OVP-11 may be used on 5V outputs only.
5. If problems are encountered in series operation of two outputs powering a common load, contact the factory for application note AN 101.
6. For 12/15 volt outputs only:

   This power supply is equipped with transformer taps for 12 volt and 15 volt operation. Factory connection of the 15 volt taps is standard procedure. If 12 volt operation is required, the 12 volt taps should be used to prevent excessive thermal dissipation at full load operation. Transformer must be removed for reconnection of taps, reconnection of taps is shown below.

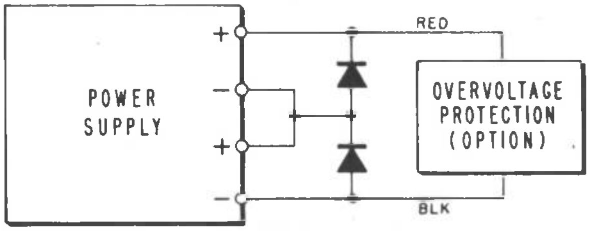
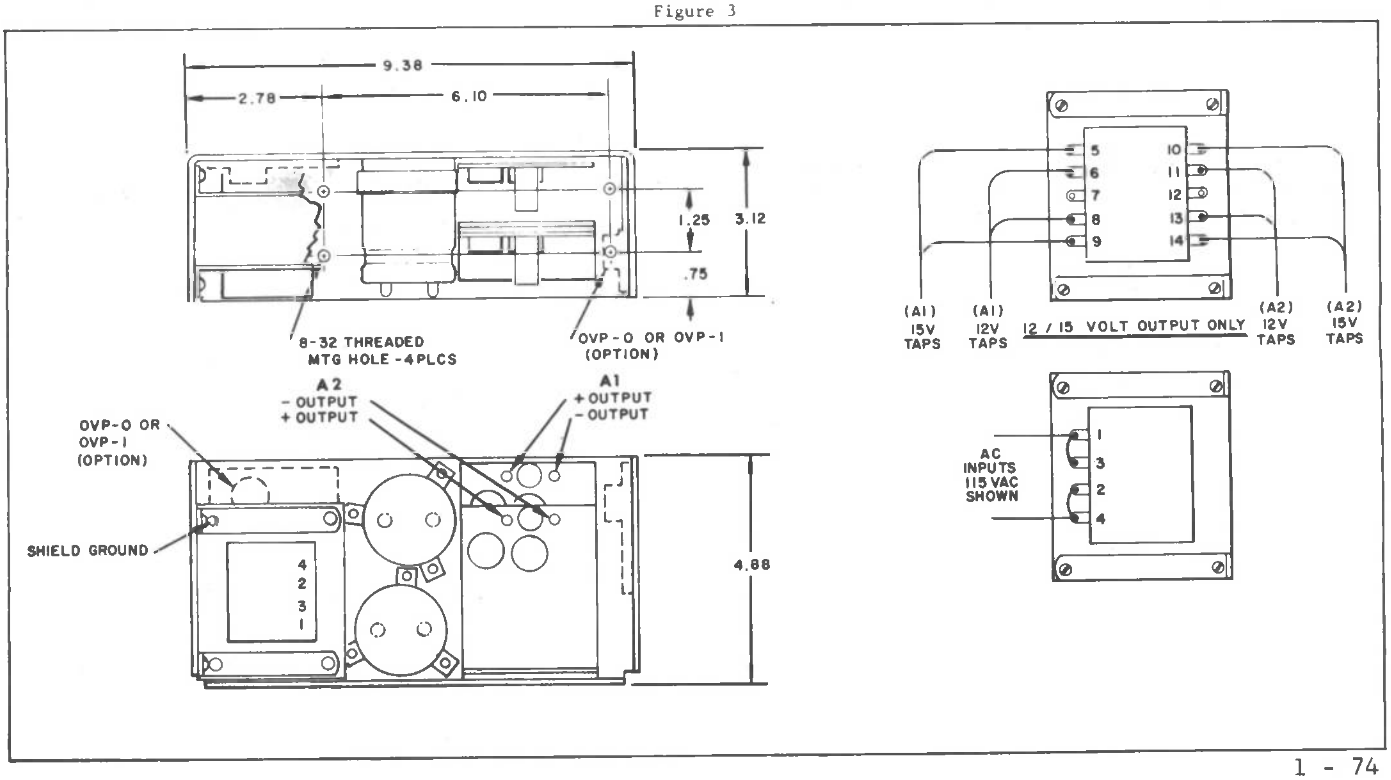


Figure 1

LOCATION	A 1	A 2
OUTPUT VOLTAGE ADJ CURRENT LIMIT ADJ	5V, 6A R14 R6	10/12V, 2.5/3.0A R10 R2
OUTPUT VOLTAGE ADJ CURRENT LIMIT ADJ	12/15V, 3/3A R10 R2	12/15V, 3/3A R10 R2
OUTPUT VOLTAGE ADJ CURRENT LIMIT ADJ		

Figure 2

Figure 3



STANDARD
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INSTRUCTION SHEET

SLS SERIES
SMP SERIES

FEATURES

- Voltage adjustment potentiometer
- Foldback current limiting
- 115/230 Vac. 47-440 Hz input
- 0.1% line/load regulation
- Temperature compensated circuitry
- 0.1% ripple
- Optional overvoltage protection
- Optional square current limiting
- Optional logic inhibit

DESCRIPTION

The SLS/SMP Series are series regulated, solid state power supply designed to provide closely regulated DC voltage in all popular voltage and current levels. The output is floating, hence voltage may be plus or minus or reference to another voltage.

OPERATING PROCEDURE

For 115 Vac. 47-440 Hz connect input leads to terminals 1 and 4 of transformer or input terminal block, terminals 1 & 3 and 2 & 4 will be jumpered. (Factory connection)

For 230 Vac. input, remove jumpers between 1 & 3 and 2 & 4. Then jumper terminals 2 and 3 together and connect 230 Vac to terminals 1 and 4. Suggest twisted AC input wires if electrical noise reduction is prime concern.

Output terminals identified in figures on back of this sheet are marked + and -. Load should be connected to these terminals with due care of proper wire size and solid electrical connection for best results. Output voltages may be adjusted with the potentiometers identified in the figures located on the back of this sheet.

SUGGESTED TEST PROCEDURE

Connect AC input power as outlined in operating procedure. Place a variac between Vac source and input to transformer. Place an AC voltmeter across transformer input terminals 1 and 4. Set input voltage for nominal 115 Vac with variac.

Place resistive load across output, check Vdc output specifications. DC voltmeter should be connected directly across output terminals. Greatest test errors are made at this point.

INE REGULATION

With output adjusted to rated voltage, reduce input Vac to 104 volts and record or note output voltage. Then increase input Vac. to 126 Vac and note ouptut voltage. Total output voltage change should not exceed .2% or ± .1%

LOAD REGULATION

Set AC input voltage to 115 Vac. Place DC voltmeter across output terminals and record or note output voltage. A load resistor, equal to the rated load of the supply at selected DC voltage setting, is then applied to output terminals. The voltage change should be noted. This differential change should not exceed .2% or ± .1% of DC output voltage.

Output current adjust is accomplished by placing a load resistor of the desired value across output terminal; adjust current limit potentiometer identified in figures on back of this sheet until voltage starts to drop. This is the fold back point of current limiting, this control is factory set to 120% of rated output and sealed.

RIPPLE

With voltage set at 115 volts and full load across DC output terminals, the measurable AC voltage on output should not exceed 0.1% RMS.

OVERVOLTAGE PROTECTION

Power supplies with OV at the end of the model number have a fixed OVP installed on the PCB. The OVP is set to fire at 6.3V ± 5%.

Optional overvoltage protection is available on most models. Consult the catalog selection guide or the listing on the next page for appropriate models or contact the factory for application note.

Loads generating high back EMF voltages should be checked with parallel diode, zener, or series diode to reduce detrimental effects on pass elements. It is recommended that the AC input circuit be fused. A suggested fuse rating is listed on the reverse side of this sheet.

SUGGESTED PRACTICES

Moving air is desireable when mounting in a confined area. Chassis may be attached to other heat dissipating surfaces to improve cooling characteristic at maximum ratings.

SLS 92 SERIES

NOTES

1. Recommended input fuse 4A, type 3AG.

2. OVP-1 is compatible with 8V through 28V models.

3. OVP-0 or OVP-11 may be used on 5V models if OV is not a part of the model number. OV at the end of model number indicates factory installed OVP.

Figure 1

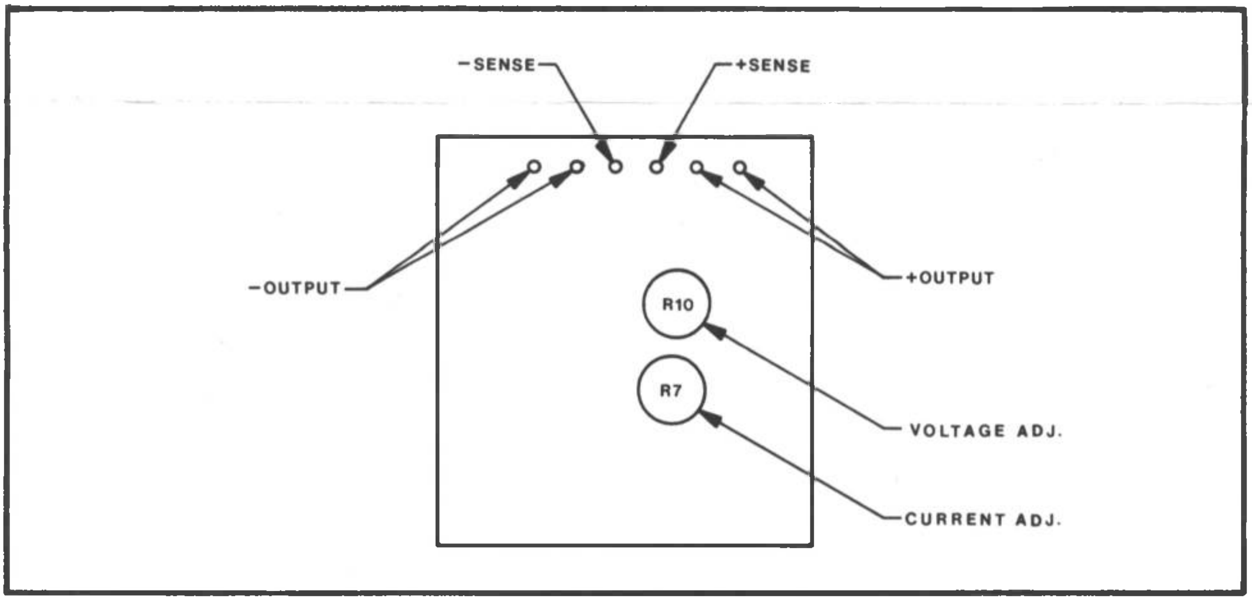
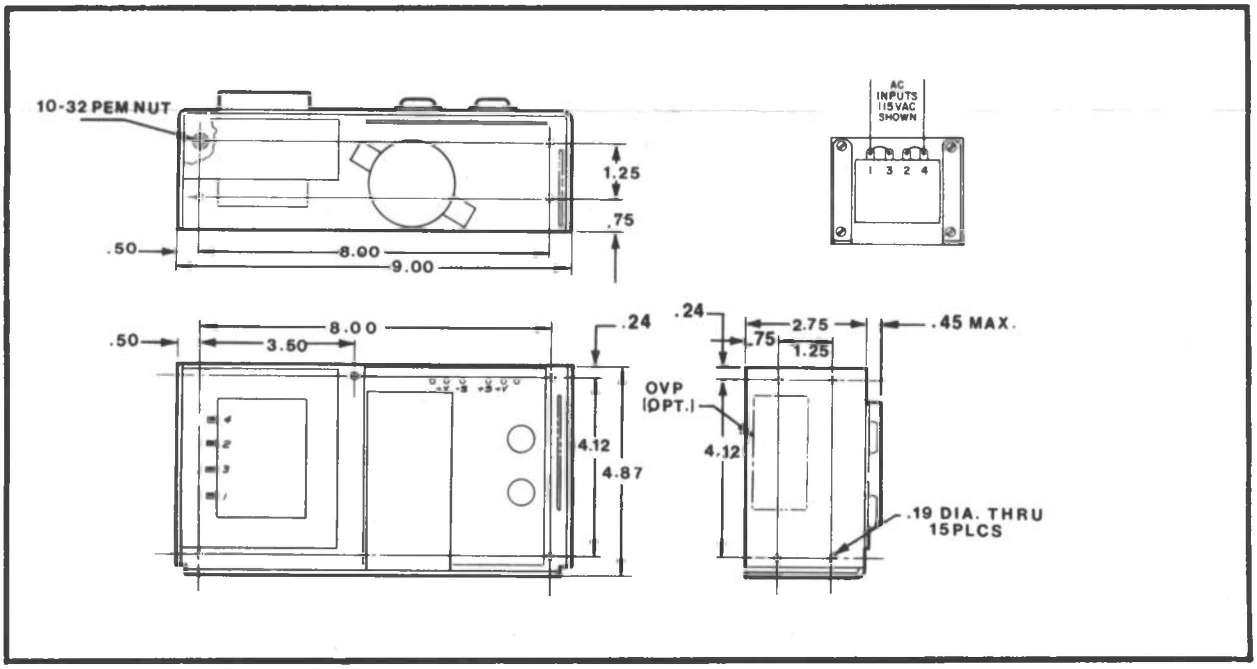


Figure 2



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INSTRUCTION SHEET

SPS 60D 12/15 DUAL OUTPUT SUPPLY

Description: The SPS 60D 12/15 Series is a series regulated, solid state power supply designed to provide adequately regulated dual DC voltages. Each output is continuously adjustable between 12 and 15 VDC. The output is 12/15 Vdc at 1.8 amps and 12/15 Vdc at 1.8 amps. A common may be connected between the supplies to permit either polarity, i.e., the supplies may be connected +12/15V, +12/15V; +12/15V -12/15V, etc.

Features:
- Dual Output + and -
- Voltage adjust pot
- 115/230 Vac input, 50/60 Hz operation
- Short circuit protection, fold back type
- 0.1% line/load regulation
- Temperature compensated circuitry
- 0.1% ripple
- Optional overvoltage protection

Operating Procedure: Connect 115 Vac, 50/60 Hz to terminals 1 and 4 of transformer. (Terminals 1 & 3 are jumpered and 2 & 4 are jumpered.)

For 220 Vac input, remove jumpers between 1 & 3 and 2 & 4. Then jumper terminals 2 and 3 together and connect 220 Vac to terminals 1 and 4. Suggest twisted AC input wires if electrical noise reduction is prime concern.

Output terminals are located on printed circuit board and are marked +, common, and -. Load should be soldered to these terminals with due care to proper wire size and solid electrical connection for best results.

Suggested Test Procedure: Connect AC input power as outlined in operating procedure. Place a variac between Vac source and input to transformer. Place an AC voltmeter across transformer input terminals 1 and 4. Set input voltage for nominal 115 Vac with variac.

Place resistive load across output, check Vdc output specifications. DC voltmeter should be connected directly across output terminals. Greatest test errors are made at this point. DC voltmeter leads must be kept short and connections as solid as possible. Resistive drops in test leads cause regulation errors. Output voltage may require adjustment. This can be accomplished by pot located on each printed circuit board. See attached sketch for location.

Line Regulation: With output voltage set at proper voltage (depending on model), reduce input Vac to 104 volts and record or note output voltage. Then increase input Vac to 126 Vac and note output voltage. Total output voltage change should not exceed .2% or ± .1%. Test each side separately.

Load Regulation: Set AC input voltage to 115 Vac. Place DC voltmeter across output terminals. A load resistor, equal to the rated load of this supply at selected DC voltage setting, is then applied to output terminals. The voltage change should be noted. This differential change should not exceed .2% or ± .1% of DC output voltage. Test each side separately.

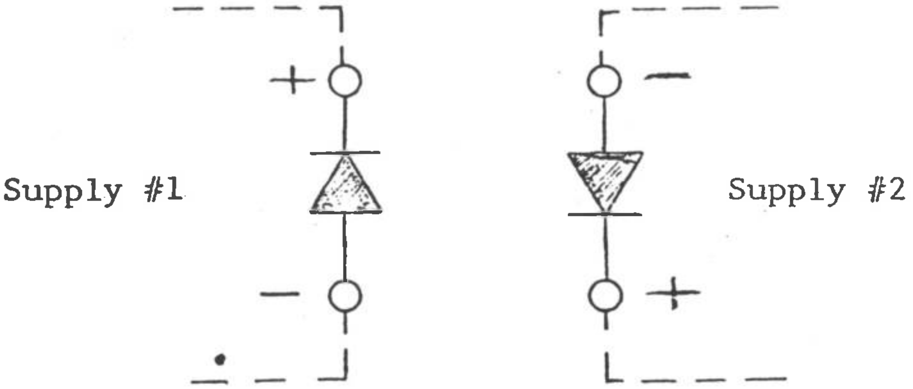
Ripple: With voltage set at 115 volts and full load across DC output terminals, the measurable AC voltage on output should not exceed 0.1% Test each side separately.

Suggested Practices: It is not required; however, chassis should be attached to other heat dissipating surfaces if full power over extended periods is desired.

Loads generating high back EMF voltages should be checked with zener or series diode to reduce detrimental effects on pass elements.

Optional OVP: The OVP may be connected in two ways.

1. An individual OVP may be connected across each outp
2. If the supply outputs are connected so that the output is + and -, one OVP may be connected across the total + and - output if a 3 amp diode is connected across each set of output terminals as shown below.



STANDARD
POWER
INC.

OVERVOLTAGE PROTECTION

CROWBAR

DESCRIPTION

The overvoltage protection (OVP) is a device designed to protect against undesirable overvoltage conditions, which may occur due to power supply regulation, or power distribution malfunction.

CIRCUIT THEORY

A voltage reference is established by a zener in series with a divider network placed in shunt across DC output of power source. The zener reference voltage is amplified through a transistor stage connected to a SCR gate. The SCR is shunted across the output of the DC source.

THEORY OF OPERATION

When the source voltage rises above the preset threshold level, the SCR is triggered on causing what appears to be a short across the DC source, thereby reducing the DC source voltage to near zero.

APPLICATION

The OVP leads are placed red to + Vdc and black to - Vdc of power supply output. The voltage adjust pot on OVP printed circuit board is turned counterclockwise to its stop (facing component side of printed circuit board). The desired trip point of overvoltage is set on Vdc output of supply. Then the pot on the OVP is turned clockwise until the OVP fires or crowbars. Turn off the DC supply and re-adjust power supply to desired operating voltage. The OVP will recover or reset automatically when DC voltage is turned off and the capacitors have discharged. If difficulty is experienced in adjusting the power supply output to the desired OVP firing point, contact the factory for application note (AN 105). An auxillary power supply should not be used to trigger the OVP unless the OVP is disconnected from the power supply under test. Failure to disconnect the OVP before the auxillary supply is connected may damage the power supply. Fusing of primary or secondary of power supply is recommended to avoid damage to supply in the event that regulator is shorted when the OVP is actuated. Suggested primary fuse values are listed on the instruction sheet of each power supply model. Fuse type 3 AG or 3 AB are recommended.

	OVP-0
TRIGGER VOLTAGE RANGE	6.5 Vdc ± 5%
CONTINUOUS SHUNT CURRENT	8 Amps Max.
INSTANTANEOUS SHUNT CURRENT	80 Amps Max.

	OVP-1	**OVP-11**	**OVP-21**
ADJUSTABLE VOLTAGE RANGE	5.35 - 32 Vdc	5 - 8 Vdc	25 - 75 Vdc
CONTINUOUS SHUNT CURRENT	8 Amps Max.	8 Amps Max.	8 Amps Max.
INSTANTANEOUS SHUNT CURRENT	80 Amps Max.	80 Amps Max.	80 Amps Max.

	OVP-2	**OVP-12**	**OVP-22**
ADJUSTABLE VOLTAGE RANGE	5.35 - 32 Vdc	5 - 8 Vdc	25 - 75 Vdc
CONTINUOUS SHUNT CURRENT	16 Amps Max.	16 Amps Max.	16 Amps Max.
INSTANTANEOUS SHUNT CURRENT	240 Amps Max.	240 Amps Max.	240 Amps Max.

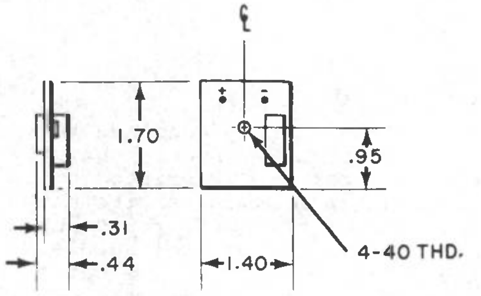
	OVP-3	**OVP-13**	**OVP-23**
ADJUSTABLE VOLTAGE RANGE	5.35 - 32 Vdc	5 - 8 Vdc	25 - 75 Vdc
CONTINUOUS SHUNT CURRENT	35 Amps Max.	35 Amps Max.	35 Amps Max.
INSTANTANEOUS SHUNT CURRENT	450 Amps Max.	450 Amps Max.	450 Amps Max.

	OVP-4	**OVP-14**	**OVP-24**
ADJUSTABLE VOLTAGE RANGE	5.35 - 32 Vdc	5 - 8 Vdc	25 - 75 Vdc
CONTINUOUS SHUNT CURRENT	60 Amps Max.	60 Amps Max.	60 Amps Max.
INSTANTANEOUS SHUNT CURRENT	1000 Amps Max.	1000 Amps Max.	1000 Amps Max.

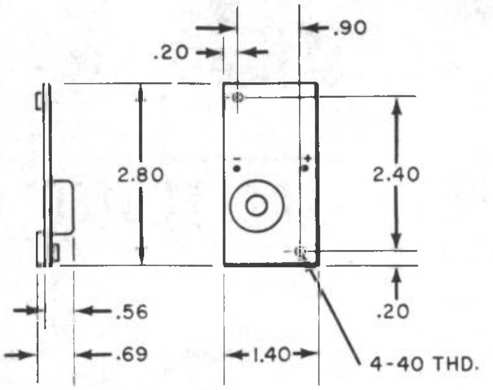
	OVP-5	**OVP-15**	**OVP-25**
ADJUSTABLE VOLTAGE RANGE	5.35 - 32 Vdc	5 - 8 Vdc	25 - 75 Vdc
CONTINUOUS SHUNT CURRENT	80 Amps Max.	80 Amps Max.	80 Amps Max.
INSTANTANEOUS SHUNT CURRENT	1000 Amps Max.	1000 Amps Max.	1000 Amps Max.

PHYSICAL CHARACTERISTICS

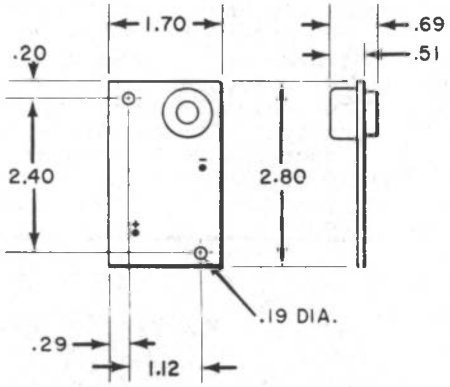
OVP - 0



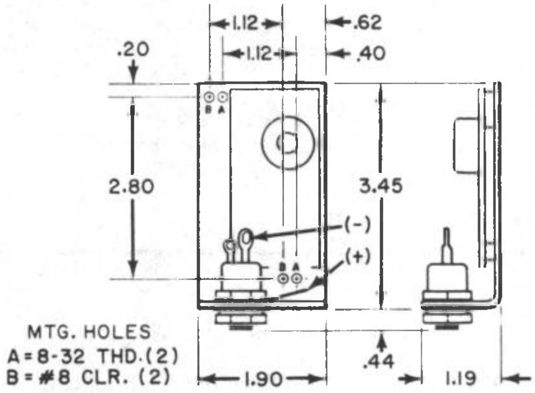
OVP - 1 or 11 or 21



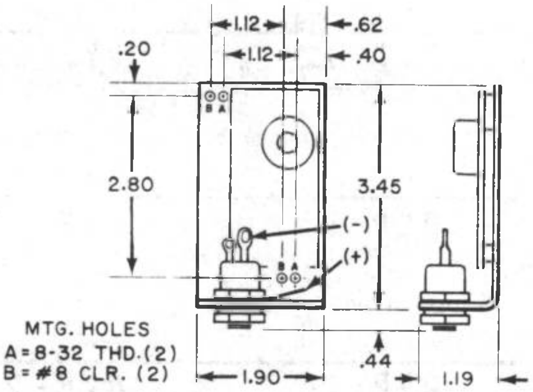
OVP - 2 or 12 or 22



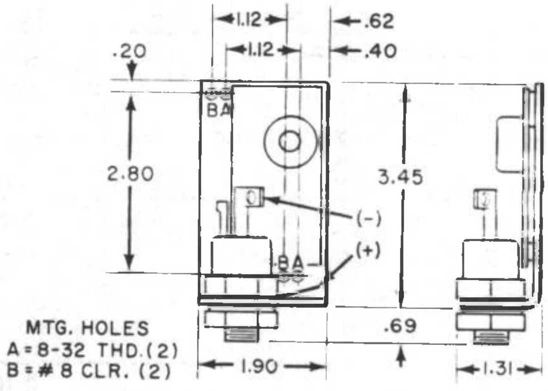
OVP - 3 or 13 or 23



OVP - 4 or 14 or 24



OVP - 5 or 15 or 25



NOTES:

1. All dimensions in inches
2. Typical voltage adjustment (component side of PC board)
   CW......6.0 Volts
   CCW.....30 Volts

STANDARD POWER SUPPLIES

INSTRUCTION SHEET

SLS SERIES
SMP SERIES

FEATURES

- Voltage adjustment potentiometer
- Foldback current limiting
- 115/230 Vac. 47-440 Hz input
- 0.1% line/load regulation
- Temperature compensated circuitry
- 0.1% ripple
- Optional overvoltage protection
- Optional square current limiting
- Optional logic inhibit

DESCRIPTION

The SLS/SMP Series are series regulated, solid state power supply designed to provide closely regulated DC voltage in all popular voltage and current levels. The output is floating, hence voltage may be plus or minus or reference to another voltage.

OPERATING PROCEDURE

For 115 Vac. 47-440 Hz connect input leads to terminals 1 and 4 of transformer or input terminal block, terminals 1 & 3 and 2 & 4 will be jumpered. (Factory connection)

For 230 Vac. input, remove jumpers between 1 & 3 and 2 & 4. Then jumper terminals 2 and 3 together and connect 230 Vac to terminals 1 and 4. Suggest twisted AC input wires if electrical noise reduction is prime concern.

Output terminals identified in figures on back of this sheet are marked + and -. Load should be connected to these terminals with due care of proper wire size and solid electrical connection for best results. Output voltages may be adjusted with the potentiometers identified in the figures located on the back of this sheet.

SUGGESTED TEST PROCEDURE

Connect AC input power as outlined in operating procedure. Place a variac between Vac source and input to transformer. Place an AC voltmeter across transformer input terminals 1 and 4. Set input voltage for nominal 115 Vac with variac.

Place resistive load across output, check Vdc output specifications. DC voltmeter should be connected directly across output terminals. Greatest test errors are made at this point.

LINE REGULATION

With output adjusted to rated voltage, reduce input Vac to 104 volts and record or note output voltage. Then increase input Vac. to 126 Vac and note ouptut voltage. Total output voltage change should not exceed .2% or + .1%

LOAD REGULATION

Set AC input voltage to 115 Vac. Place DC voltmeter across output terminals and record or note output voltage. A load resistor, equal to the rated load of the supply at selected DC voltage setting, is then applied to output terminals. The voltage change should be noted. This differential change should not exceed .2% or ± .1% of DC output voltage.

Output current adjust is accomplished by placing a load resistor of the desired value across output terminal; adjust current limit potentiometer identified in figures on back of this sheet until voltage starts to drop. This is the fold back point of current limiting, this control is factory set to 120% of rated output and sealed.

RIPPLE

With voltage set at 115 volts and full load across DC output terminals, the measurable AC voltage on output should not exceed 0.1% RMS.

OVERVOLTAGE PROTECTION

Power supplies with OV at the end of the model number have a fixed OVP installed on the PCB. The OVP is set to fire at 6.3V ± 5%.

Optional overvoltage protection is available on most models. Consult the catalog selection guide or the listing on the next page for appropriate models or contact the factory for application note.

Loads generating high back EMF voltages should be checked with parallel diode, zener, or series diode to reduce detrimental effects on pass elements. It is recommended that the AC input circuit be fused. A suggested fuse rating is listed on the reverse side of this sheet.

SUGGESTED PRACTICES

Moving air is desireable when mounting in a confined area. Chassis may be attached to other heat dissipating surfaces to improve cooling characteristic at maximum ratings.

SLS 32 SERIES
SMP 32 SERIES

NOTES

1. Recommended input fuse 0.6Atype 3AG.
2. OVP-1 is compatible with 8V through 28V models.
3. OVP-0 or OVP-11 may be used on 5V models if OV is not a part of the model number. OV at end of model number indicates factory installed OVP.

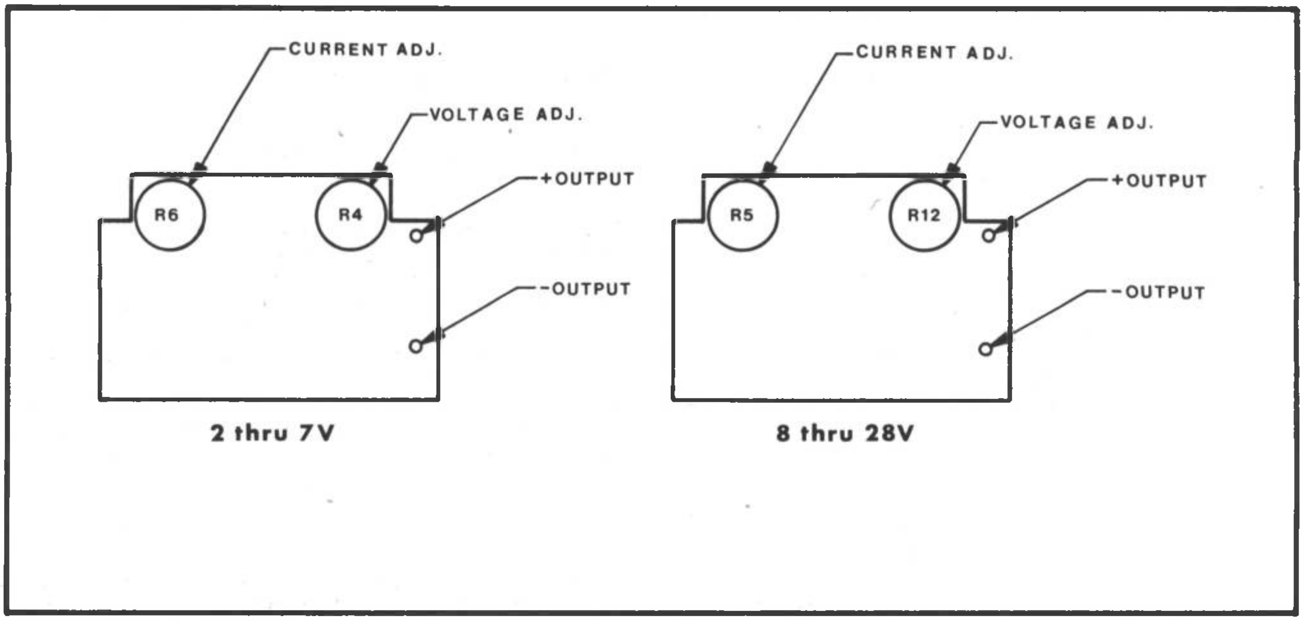
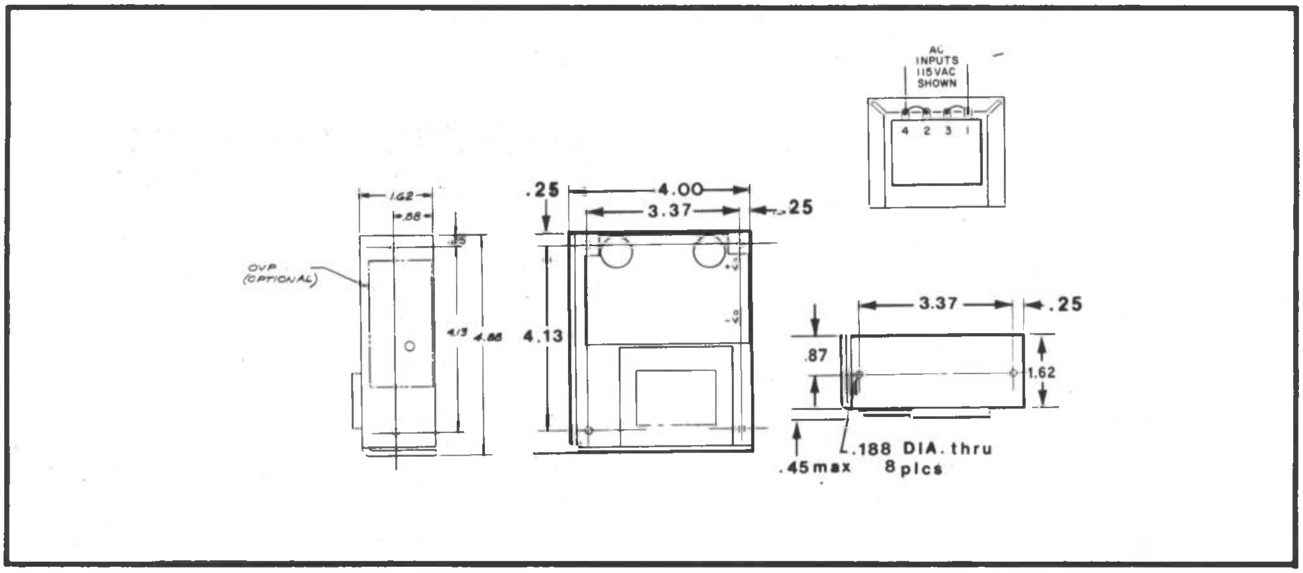


Figure 1

Figure 2



STANDARD
POWER
SUPPLIES

INSTRUCTION SHEET

SLS SERIES
SMP SERIES

FEATURES

- Voltage adjustment potentiometer
- Foldback current limiting
- 115/230 Vac. 47-440 Hz input
- 0.1% line/load regulation
- Temperature compensated circuitry
- 0.1% ripple
- Optional overvoltage protection
- Optional square current limiting
- Optional logic inhibit

DESCRIPTION

The SLS/SMP Series are series regulated, solid state power supply designed to provide closely regulated DC voltage in all popular voltage and current levels. The output is floating, hence voltage may be plus or minus or reference to another voltage.

OPERATING PROCEDURE

For 115 Vac. 47-440 Hz connect input leads to terminals 1 and 4 of transformer or input terminal block, terminals 1 & 3 and 2 & 4 will be jumpered. (Factory connection)

For 230 Vac. input, remove jumpers between 1 & 3 and 2 & 4. Then jumper terminals 2 and 3 together and connect 230 Vac to terminals 1 and 4. Suggest twisted AC input wires if electrical noise reduction is prime concern.

Output terminals identified in figures on back of this sheet are marked + and -. Load should be connected to these terminals with due care of proper wire size and solid electrical connection for best results. Output voltages may be adjusted with the potentiometers identified in the figures located on the back of this sheet.

SUGGESTED TEST PROCEDURE

Connect AC input power as outlined in operating procedure. Place a variac between Vac source and input to transformer. Place an AC voltmeter across transformer input terminals 1 and 4. Set input voltage for nominal 115 Vac with variac.

Place resistive load across output, check Vdc output specifications. DC voltmeter should be connected directly across output terminals. Greatest test errors are made at this point.

LINE REGULATION

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LOAD REGULATION

Set AC input voltage to 115 Vac. Place DC voltmeter across output terminals and record or note output voltage. A load resistor, equal to the rated load of the supply at selected DC voltage setting, is then applied to output terminals. The voltage change should be noted. This differential change should not exceed .2% or ± .1% of DC output voltage.

Output current adjust is accomplished by placing a load resistor of the desired value across output terminal; adjust current limit potentiometer identified in figures on back of this sheet until voltage starts to drop. This is the fold back point of current limiting, this control is factory set to 120% of rated output and sealed.

RIPPLE

With voltage set at 115 volts and full load across DC output terminals, the measurable AC voltage on output should not exceed 0.1% RMS.

OVERVOLTAGE PROTECTION

Power supplies with OV at the end of the model number have a fixed OVP installed on the PCB. The OVP is set to fire at 6.3V ± 5%.

Optional overvoltage protection is available on most models. Consult the catalog selection guide or the listing on the next page for appropriate models or contact the factory for application note.

Loads generating high back EMF voltages should be checked with parallel diode, zener, or series diode to reduce detrimental effects on pass elements. It is recommended that the AC input circuit be fused. A suggested fuse rating is listed on the reverse side of this sheet.

SUGGESTED PRACTICES

Moving air is desireable when mounting in a confined area. Chassis may be attached to other heat dissipating surfaces to improve cooling characteristic at maximum ratings.

SLS 92 SERIES

NOTES

1. Recommended input fuse 4A, type 3AG.

2. OVP-1 is compatible with 8V through 28V models.

3. OVP-0 or OVP-11 may be used on 5V models if OV is not a part of the model number. OV at the end of model number indicates factory installed OVP.

Figure 1

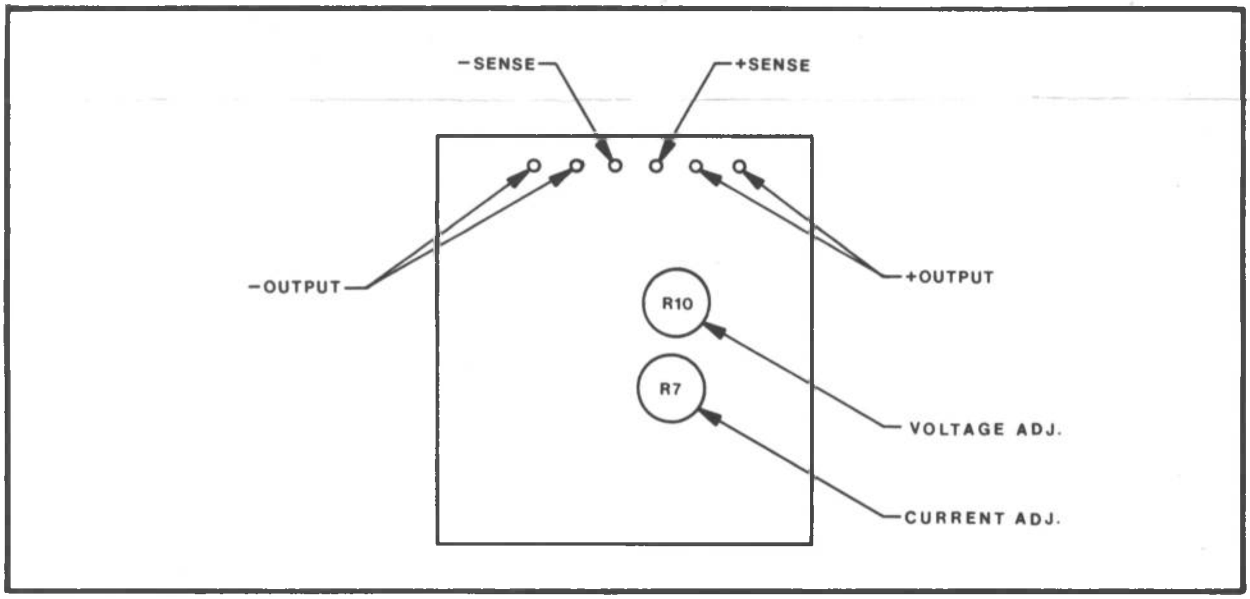
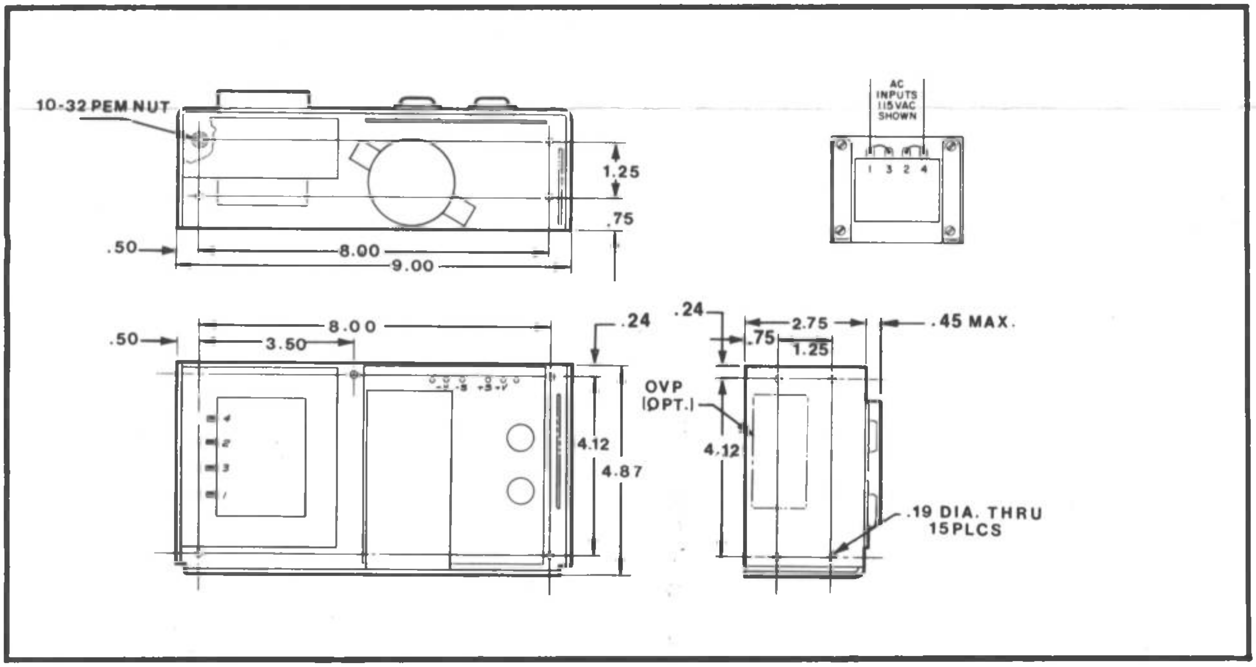


Figure 2

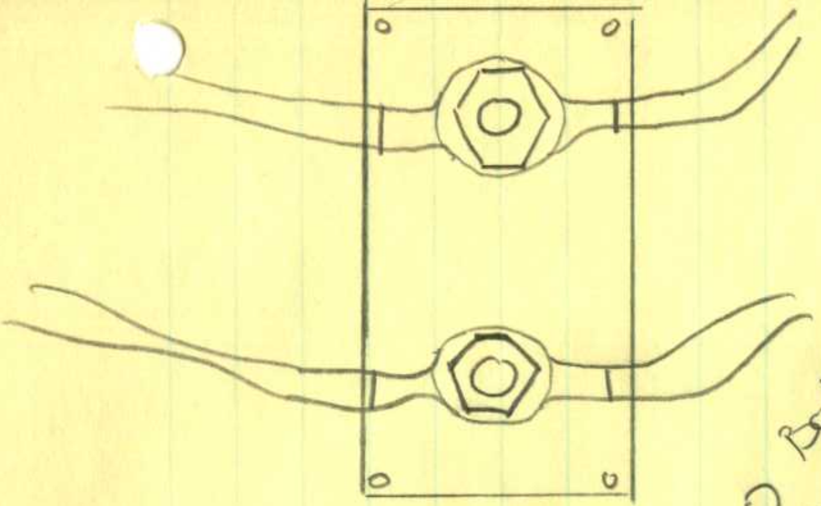


PWR. REQ. TYP. mA

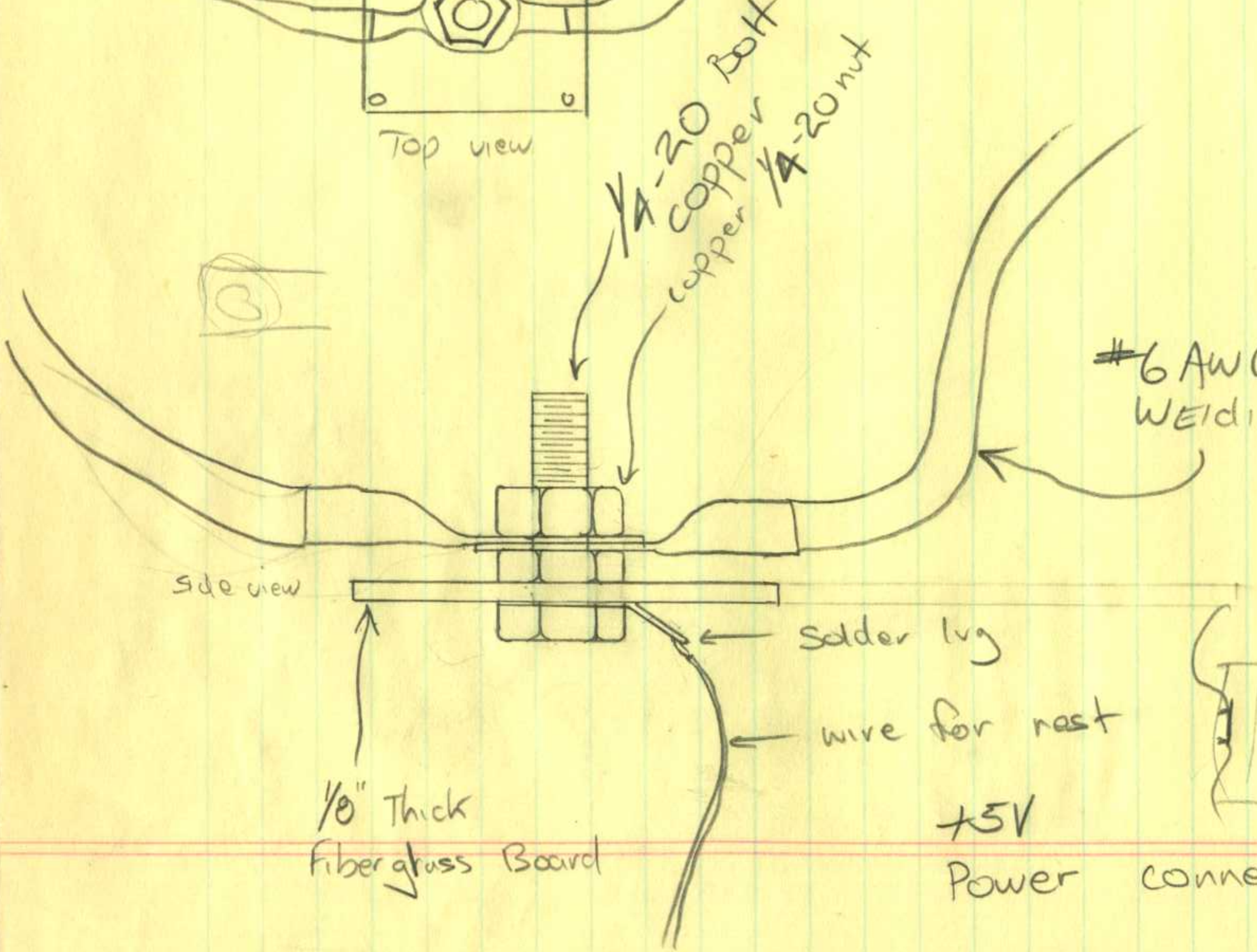
RPU (2 NESTS)	+15	-15	+5	
1- SYNC	—	—	912	
1- RASTER GEN	88	89	—	
12 - 12 BIT MDAC	768	576	5868	
2 - 8 BIT DAC	240	8	1148	
1- DECODER	—	—	300	est.
1- BLANKING	50	50	300	est.
2- INTENSITY	100	100	—	est.
	1246	823	8528	
	1.2A	.8A	8.5A	

PWR. REQ. TYP.

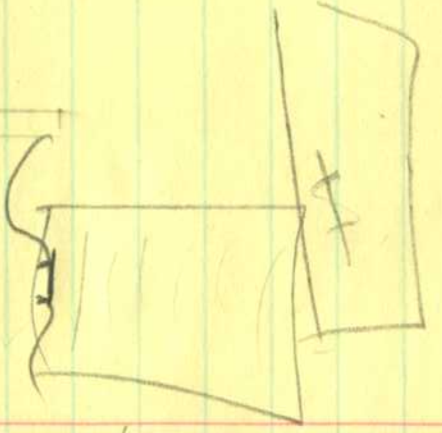
FUNCT. GEN NEST	+15	-15	+5
3 - FG SEL	048	048	1233
2 - 12BIT MDAC	128	096	978
6 - FG	600	600	12000
1 - COMB	100	100	2000
	876	844	26211
			85
			3497



Top view

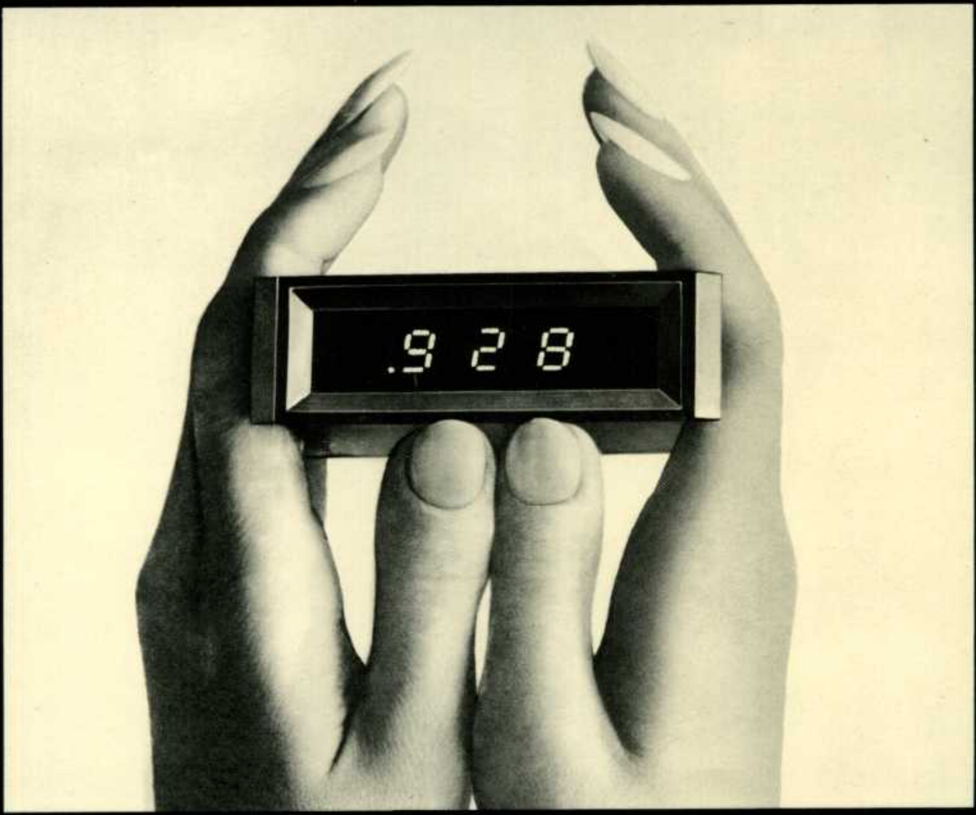


side view



NON-LINEAR SYSTEMS, INC.

THE ORIGINATOR OF THE DIGITAL VOLTMETER!!



PRESENTS A LINE OF
DIGITAL PANEL METERS
FEATURING
ACCURACY—READABILITY—DEPENDABILITY

- *DC OR AC READOUT MODELS*
- *DC OR AC POWERED MODELS*
- *3, 3½ AND 4 DIGITS*
- *RANGE CHANGE CAPABILITIES*
- *AUTOMATIC POLARITY*
- *PROGRAMMABLE DECIMAL*
- *LOW POWER REQUIREMENTS*
- *MOS/LSI CONSTRUCTION*
- *LED OR LCD DISPLAY*
- *NO ZERO ADJUSTMENT*
- *OVERLOAD INDICATION*
- *ONE YEAR WARRANTY*

AND
DIGITAL COUNTERS
FEATURING

- *SOLID STATE LSI DESIGN*
- *EVENT COUNTING OR PRESET COUNTING CAPABILITIES*
- *LED DISPLAY*
- *EVENT COUNTING*
- *4½ AND 5 DIGITS*

Non-Linear Systems, Inc. 26th Year of Progress

PM SERIES PANEL METERS

No Smaller Panel Meters Available!

PM-3 99^{50}
3 DIGITS

0.1% Accuracy
With LED Readout

*

PM-3.5 109
3½ DIGITS

0.05% Accuracy
With LED Readout

*

PM-4 170
FULL 4 DIGITS

0.02% Accuracy
With LED Readout

FEATURES

- **MOS/LSI Construction.**
- **Smallest package available anywhere (Less than 1" high).**
- **Lowest power requirements—less than 0.8 watts.**
- **Reliability enhanced by burn-in at elevated temperature.**
- **Multiple ranges, ± 1V to ± 1000V F.S. (± 0.1V range optional on PM-3 & PM-4).**
- **No zero adjustment.**

SPECIFICATIONS

Description	PM-3	PM-3.5	PM-4
Voltage Ranges	1, 10, 100, 1000 vdc	0-±1.999, ±19.99, ±199.9, ±1200 vdc	±1, ±10, ±100, ±1000 vdc
Accuracy (±23°C ±2°)	±0.1% F.S.	±(0.05% Rdg ±0.05% F.S.	±0.02% F.S.
Input Impedance	1V=1000 MΩ; 10V=1 MΩ; 100 & 1000V =10MΩ	±1.999V = 1000MΩ, ±19.99V = 1 MΩ; ±199.9 & ±1200V = 10 MΩ	Same as PM-3
Display Height	0.3" LED	0.3" LED	0.3" LED
Update Rate, Nominal	3 Rdg/Sec	3 Rdg/Sec	2 Rdg/Sec
Power Requirements	+5V (±5%) dc @ 160 mA	+5V (±5%) dc @ 200 mA	+5V (±5%) dc @ 160 mA
Common-Mode Rejection, Minimum	80 DB	80 DB	80 DB
Common-Mode Compliance	±100 mV	±100 mV	±100 mV
Operating Temperature	0-60° C	0-60° C	0-60° C
Zero Adjustment Required	No	No	No

CARD-EDGE CONNECTORS: AVAILABLE FOR PM-3 AND PM-4, NLS P/N 39-195; FOR PM-3.5, NLS P/N 39-182.

STANDARD AND OPTIONAL FEATURES

Description	PM-3	PM-3.5	PM-4
Decimal Positioning Capability	Standard	Standard	Standard
Control Signals: Reading Hold	Standard	Standard	Standard
Control Signals: Polarity Inhibit	Optional	Standard	Standard
Control Signals: Display inhibit & Dimming	Optional	Standard	Optional
Control Signals: Scale Factor Adjustment	8%	10%	8%
Output: Busy/Done	Standard	Standard	Standard
Output: Multiplexed BCD	Optional	Standard	Optional
Input Voltage Protection	Standard	Standard	Standard
Overload Indication	Standard	Standard	Standard
Bipolar Operation	Optional	Standard	Standard
Automatic Polarity	Optional	Standard	Standard
Ratio Operation	Optional	Standard	Optional
Active Filter Input	N/A	Standard	N/A
Special Scaling	Optional	Optional	Optional
Offset Capability	Optional	Optional	Optional
Current Meter Operation	Optional	Optional	Optional
100 mV Full Scale Range	Optional	N/A	Optional

RANGE CHANGE KITS: AVAILABLE FOR PM-3 AND PM-4; P/N 39-189-1, -2, -3 AND 4. FOR PM-3.5; P/N 39-291, -1, -2, -3 AND 4.

Non-Linear Systems, Inc. NLS 26th Year of Progress

PM THRIFT METER SERIES

Great Performance At Thrifty Prices

PM-349

55^{65}

3½ DIGITS

With LED Readout

SOLDERED COMPONENTS
OUR LOWEST PRICED METER

PM-350

69^{55}

3½ DIGITS

3 1/4

2 1/2"

1 3/16

With LED Readout
With Plug in Components

(Range change resistors, LED's and IC's are plug in.)

PM-351

78^{10}

3½ DIGITS

With LCD Readout
With Plug in Components

(Range change resistors, LED's and IC's are plug in.)

FEATURES

- **MOS/LSI construction.**
- **Less than 1" high.**
- **Large LCD or LED display.**
- **Programmable decimal.**
- **No zero adjustment.**
- **Overload indication.**
- **Low power requirement.**
- **Display blanking.**
- **Automatic polarity.**
- **Input voltage protection.**
- **0.2V, 2V, 20V, 200V or 1000V range.**

SPECIFICATIONS

Voltage Ranges: 0 - ±0.1999/1.999/19.99/199.9/ or 1000vdc

Accuracy (+23°C ±2°): ±(0.05% Reading + 0.05% Full Scale)

Input Impedance: 0.1999V = 100 MΩ; 1.999V = 1000MΩ; 19.99V= 1 MΩ; 199.9V & 1000V = 10 MΩ

Display Height: 0.3" LED or LCD

Update Rate, nominal 3 Rdg/Sec

Power Requirements: +5 vdc (±5%) @ 200 mA nominal for PM-349/PM-350
+5 vdc (±5%) @ 6 mA nominal for PM-351

Common-Mode Rejection: 80 DB, minimum

Common-Mode Compliance: +100 mV

Operating Temperature: 10°C to 50°C

Zero Adjustment Required: No

CARD-EDGE CONNECTOR: AVAILABLE FOR PM-349, PM-350 AND PM-351, P/N 39-195.

STANDARD AND OPTIONAL FEATURES

Decimal Positioning Capability:	Standard
Control Signals - Polarity Inhibit: *	Standard
Control Signals - Display Inhibit: **	Standard
Control Signals - Scale Factor Adjustment:	10%
Input Voltage Protection:	Standard
Overload Indication:	Standard
Bipolar Operation:	Standard
Automatic Polarity:	Standard
Special Scaling:	Optional
Offset Capability:	Optional
Current Meter Operation:	Optional

* Standard on PM-349 & PM-350; optional on PM-351.

** Standard on PM-349 & PM-350; not available on PM-351.

RANGE CHANGE KITS: AVAILABLE FOR PM-349/-350/-351, P/N 39-356.

Non-Linear Systems, Inc. NLS 26th Year of Progress

DIGITAL COUNTERS
More Counts Per Second

PC-4 4½ DIGITS EVENT

With LED Readout

FEATURES

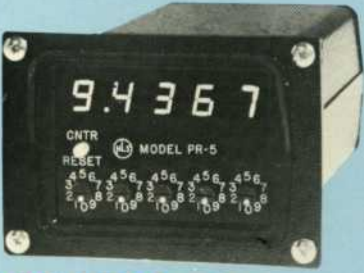
- Four and one-half digits.
- LED display.
- Less than 1" high.
- Programmable decimal.
- Low power: <0.75W.
- Multiplexed BCD output.
- MOS/LSI construction.
- Low, low price.
- Up to 0.2 MHz pulse count rate or 100 contact closures/sec.

PC-4 SPECIFICATIONS

• Speed - Logic Level Input: 0 - 200,000/second; Contact-Closure: 0 - 100/second. • Input Signal Amplitude - Logic Level Input: +3V to +15V; Contact-Closure: From open to ground for count. • Display: 0.3" high LED. • Power Requirements: +5 vdc (±5%) @ 0.75 W. • Size: 0.94"H x 2.25"W x 3.25" D. Weight: 4 ounces. • Decimal Location - Positioned by jumper on connector to any of four locations. • BCD Outputs - Multiplexed @ approximate rate of 6kHz. • Zero Suppression - GND to inhibit; connect to desired decimal select line for suppression to the left of the decimal line selected. • Blanking - For on-off intensity control connect to +5V thru variable resistor and a switch, if desired (100 mA max). • Reset - Negative-going to low (gnd) from logic level or switch. • Count Extension - at 9999 count, a carry pulse is output on next pulse to cascaded counter (9999 count maximum). One pulse occurs for each 10000 counts at the input. Output goes true at 9999 and returns to low on next pulse. (Invert when cascading.) • Latch Enable (For total counts up to 10000) - Open holds reading on counter at the time of opening. Ground returns display to total count at time of reset after the latch enable has been opened.

CARD-EDGE CONNECTOR: AVAILABLE FOR PC-4, NLS P/N 39-282.

PR-5 5 DIGITS PRESET



With LED Readout

Applicable to totalizing, batch counting, digitizing, timing, rate/frequency measurement, process control, coil winding plus many, many more.

FEATURES

- Solid-state LSI design.
- Accepts subtractive pulses for rejection subtraction.
- Multiplexed BCD output.
- Guarded preset; cannot be accidentally changed.
- Compatible with a wide range of sensors.
- Up to 0.5 MHz pulse count rate or 300 contact-closures/sec.
- Five-decade count displayed by 0.3" high LED's.
- Unlimited number of preset count.

PR-5 SPECIFICATIONS

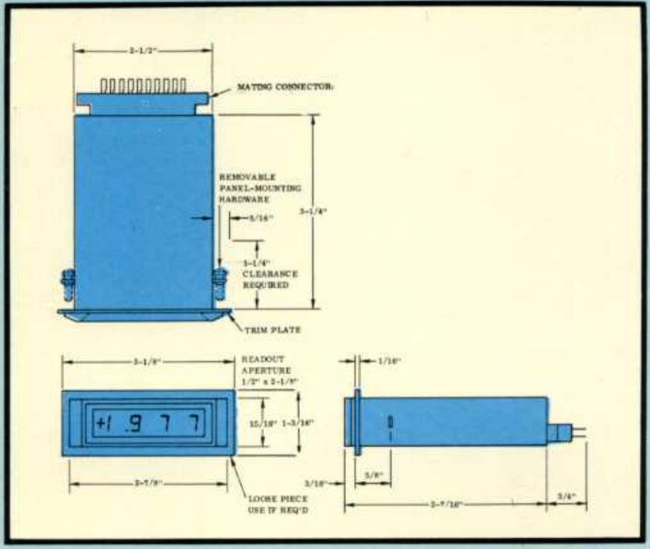
• Count Speed - Electronic Pulse: up to 500 kHz (+3V to +15V); Contact-Closure: up to 300/second. • Number of Decades: 5. • Number of Presets - One internal; unlimited with external switches. Preset number set by front panel screwdriver adjustments. • Display: 0.3" high LED, 5 digits. Displays total number of counts less any subtractive counts. • Input Impedance: 40 kilohms. • Reset Capability - Front panel pushbutton switch or external contact-closure. • Power Requirements: +12 vdc (±5%) @ 150 mA nominal (200 mA maximum). • Operating Temperature: 0° C to 50° C. • Coincidence Output - Output signal provided when displayed count is equal to the preset number (TTL logic level). • Dimensions: 2.25" H x 3.25" W x 4.0" D. • Weight: 4.75 ounces. • PR-5 is also furnished with stand-by battery power in the event normal power source fails. Order P/N PR-5B.

CARD-EDGE CONNECTORS: FURNISHED WITH PR-5, NLS P/N 39-677.

Non-Linear Systems, Inc. 26th Year of Progress

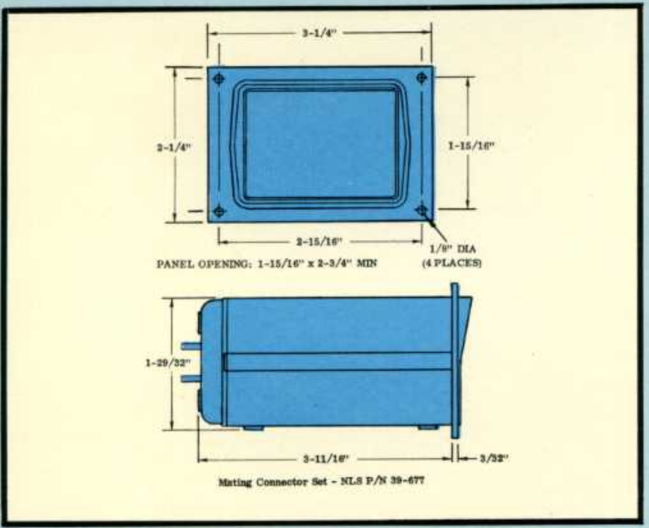
PANEL METER / COUNTER

ALL PM SERIES & PC-4



MOUNTING INSTRUCTIONS: (PM SERIES & PC-4) To mount the meter, slide trim plate over meter case facing beveled edge of trim plate forward. Insert rear of meter from front of panel cutout. Fit mounting clips into slots in sides of meter; foot of clip should face forward. Thread screws into clips and tighten against rear surface of panel. Mounting hardware included.

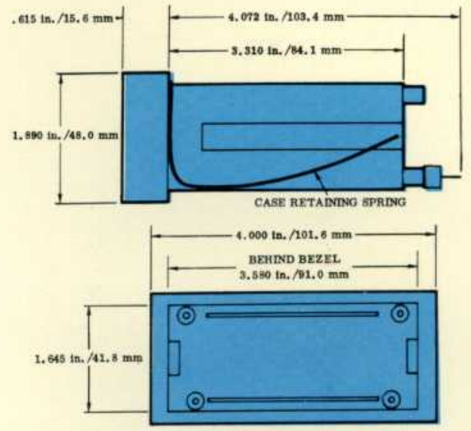
PR-5


3-1/4"
2-1/4"
1-15/16"
2-15/16"
1/8" DIA (4 PLACES)
PANEL OPENING: 1-15/16" x 2-3/4" MIN
1-29/32"
3-11/16"
3/32"
Mating Connector Set - NLS P/N 39-677

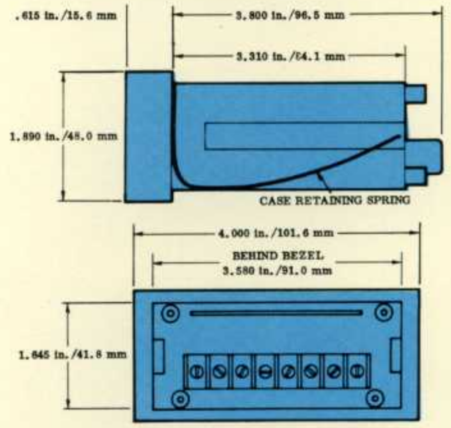
MOUNTING INSTRUCTIONS: (PR-5) To mount PR-5, insert rear of meter from front of panel cut out. Attach flange of meter case to panel with four screws, lock washer and nuts. Mounting hardware not included.

RM SERIES

RM-350/RM-351
CARD-EDGE CONNECTOR CONFIGURATION



RM-350TB/RM-351TB
TERMINAL BLOCK CONFIGURATION



MOUNTING INSTRUCTIONS: (RM SERIES) To panel-mount meter, remove retaining spring from its holes in sides of meter at rear. Insert rear of meter from front of panel cut out. Replace retaining spring and slide it behind mounting panel to fasten meter in place. Retaining spring may swing either from above or below meter. Retaining spring included.

NLS PROVIDES DISTRIBUTOR SALES
SUPPORT THAT PUTS THE PRODUCT
WHERE IT BELONGS—IN THE USER'S HANDS

PLEASE CONTACT:

Non-Linear Systems, Inc.
Originator of the digital voltmeter.
Box N, Del Mar, California 92014 Telephone (714) 755-1134

CONTROL PANEL
SYSTEM IV

CRITIQUE OF PROTOTYPE DESIGN

Presently, it seems that not enough consideration has yet been given as to how the control panel for System IV will function as an interactive tool with the operator.

As the design now stands (see GSH - 12-30-80), many buttons are blocked together, and some buttons for different animation functions are blocked together within a larger block.

For example, the buttons for COLOR are blocked next to and together with the buttons for GEOMETRY. This is not the best and most logical solution considering the stage-by-stage complexity of the animation process itself, and somehow the control panel should reflect the logic of this stage-by-stage process in the simplest and cleanest way possible for ease of animating.

As the design now stands, it is predictable that several low performance interactive problems will occur. Generally, the operator will be mentally slowed down by the large number of buttons. Overall, requirements for hand-eye coordination are going to be complex. Moreover, it will be the rare operator, who will know which keys to punch without having to glance down at the board. Ultimately, these interactive slow-downs will affect the directness of the "real time" animation process and therefore will compromise our basic design goals: fast, efficient and direct.

Bob Galka earlier proposed a control panel wherein buttons were logically blocked in different configurations according to separate animation functions. His panel is simple and direct, and it could probably work fairly well as a touch system once the operator has oriented himself to the panel.

In summary, because there seems to be room for design improvement at this prototype stage, I suggest we sprend some time solving these interactive problems now, or soon. The control panel is an important design aspect of System IV. In effect, to the animator/operator, it is the machine. Thus, its logical lay-out will in large part determine the effectiveness of System IV as a fast efficient tool.

Here are a few preliminary suggestions from operators, which should help the logical lay-out of the control panel:

1.) The COLOR buttons should be flip-flopped with the GEOMETRY buttons. The geometry buttons should be closer to the center of the whole panel as the geometry buttons will be used more often.

(NOTE: At the time of writing, this change was already okayed by Glenn Hill)

2.) If, at all possible, the shaft encoders should be in direct line with the central monitor for good hand-eye coordination.

3.) "Traverse the Forest" should perhaps be on the right-handed side of the key board, because it is needed in Animate.

4.) Playback and keep-it buttons are good where they are, by the way. All too often mistakes have occured by punching a wrong button on Caesar.

5.) A left-handed person may react very differently to the present lay-out of the panel than a right-handed person. Therefore, the design of the board ideally should be ambidextrous.

REQUEST: If production continues to be slow, I would be glad to help as coordinator between production and engineering to bring a better solution for a control panel for System IV.

Thank you,

Abby —

Abigail Dunn

JIM WOLFF
Changes in Board

↓

SIZE	WIDTH	HEIGHT	DEPTH	MASK1 RADIUS	MASK2 RADIUS	MASK 3 RADIUS	RED 1	RED 2	RED 3	RED 4	RED 5	* STUBS 9
COMPAS	SKEW XZ	TRNSLT X	CENTER X	PROPRT X	MASK2 ANGLE	MASK3 ANGLE	GREEN 1	GREEN 2	GREEN 3	GREEN 4	GREEN 5	* STUBS 10
INCLNT	SKEW XY	TRNSLT Y	CENTER Y	PROPRT Y	VBLST	VBLW	BLUE 1	BLUE 2	BLUE 3	BLUE 4	BLUE 5	INTENS
ROTATE	SKEW ZX	TRNSLT Z	CENTER Z	PROPRT Z	HBLST	HBLW	AUX SIG 1	AUX SIG 2	AUX SIG 3	AUX SIG 4	AUX SIG 5	AUX SIG 6

↑

CAM A	RED
CAM B	GREEN
CAM AUX 1 *	BLUE
CAM AUX 2 *	LUM

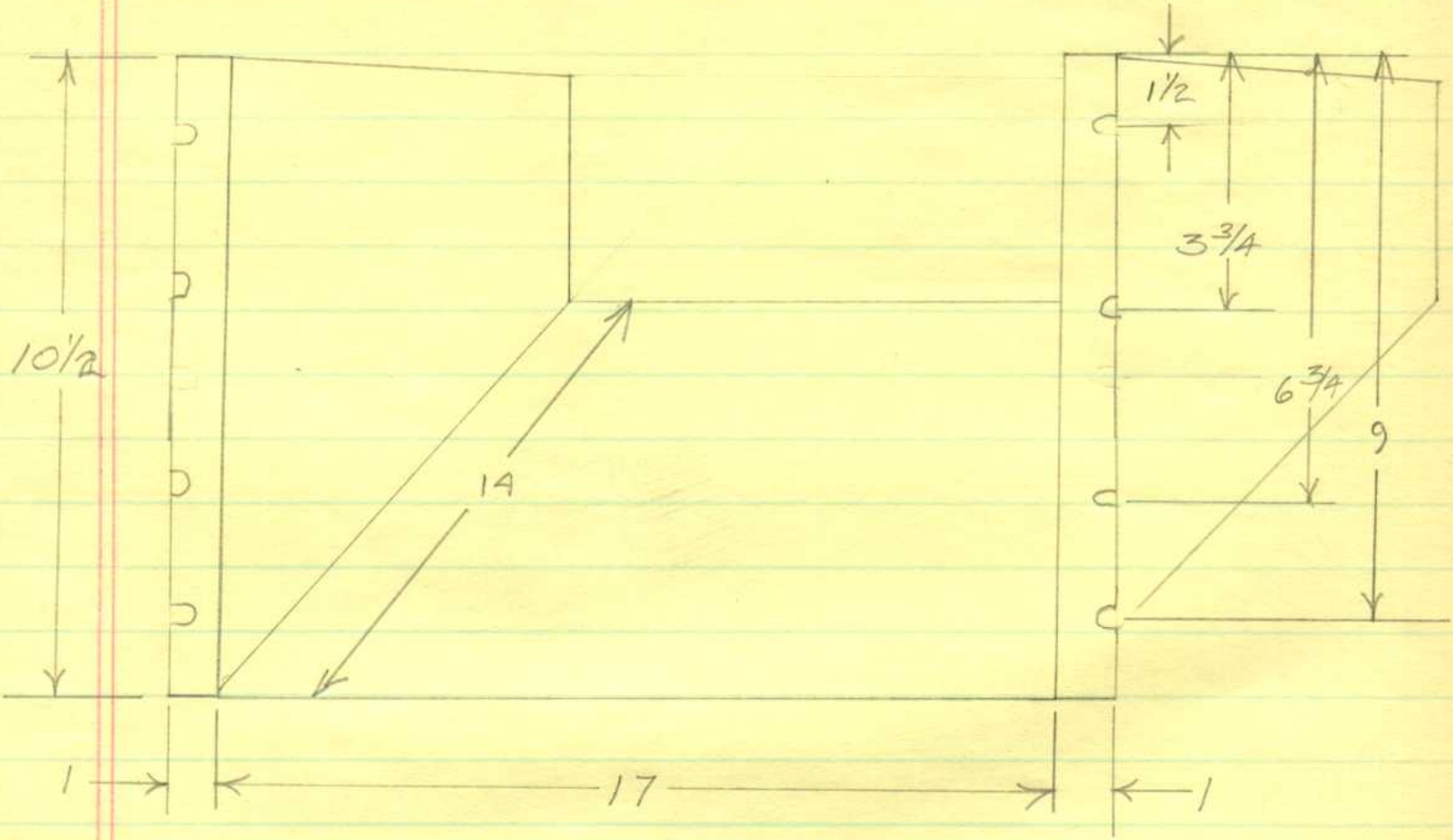
OVRLAP
SEC OVRLAP
EX BLANK
SPEC BLANK

SEL RED FG	
SEL GREEN FG	
SEL BLUE FG	
SEL INTENS FG	

CONT →

COMPUTER TERMINAL RACK ADAPTER

5/12/81 gH



1/6/81 9AH

Unistrut Pieces for Control Panel System IV

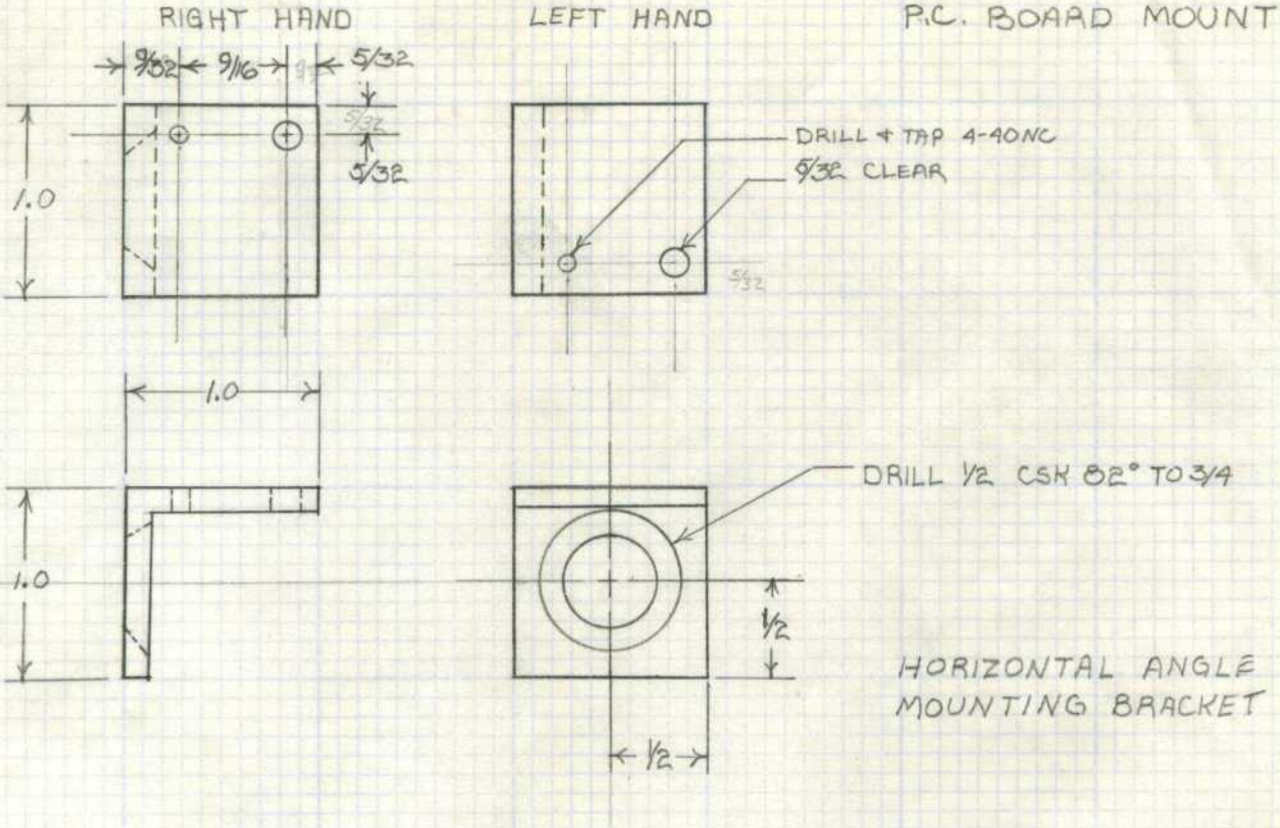
	Piece no	Type	lenth	Finish
	1	A3301	66½"	Paint Black
proto	2	A1000EA	15⅛"	Anodize Black
	2	A1000EA	27⅛"	↓
	3	A4001EA	13⅞"	
	4	↓		
	5			
	6			
proto	7	A1000EA	15⅛"	
	7	A1000EA	27⅛"	
	8	A4001EA	64"	
not used on proto	9	A1000EA	12"	
	10	A1000EA	12"	
	11	A4001 EA	21¼"	
	12	A4001 EA	21¼"	

Total amount for one system (rounded up to nearest foot)

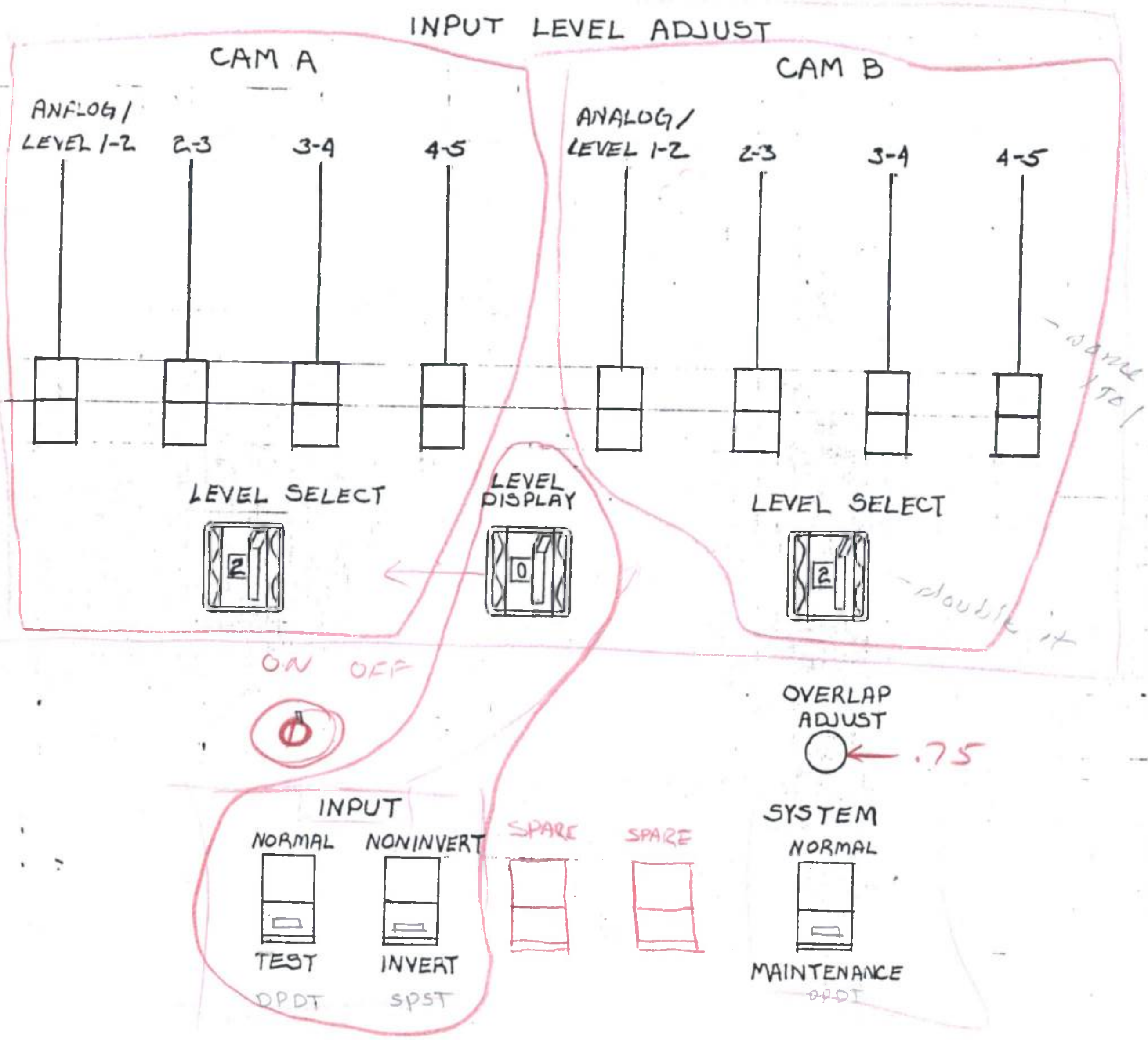
TYPE	Prototype	Production	Price/C'
A3301	6 ft	6 ft	278^{60}
A1000EA	3 ft	7 ft	136^{30}
A4001 EA	10 ft	14 ft	193^{10}
A1026	20 ea	28 ea	67^{70}
A4008	40 ea	56 ea	49^{60}
3/8"-16 X 3/4" long	40 ea	56 ea	12^{20}

4-6 wk

CONTROL PANEL
P.C. BOARD MOUNTING



HORIZONTAL ANGLE
MOUNTING BRACKET



NUMBER SEC	AUTO SEC	MANUAL SEC	SPECIAL SEC	ADJUST SEC
SEC CAMERA	DIM-ENSION	VIDEO RATE	LOAD WAVE-FORM	
NAME SECTION	NAME SCENE	ACT PARAM	DEACT PARAM	IN RANGE
GROUP	DELETE GROUP	NODE	DELETE NODE	
CREATE	GET	RENAME	PRINT	SAVE

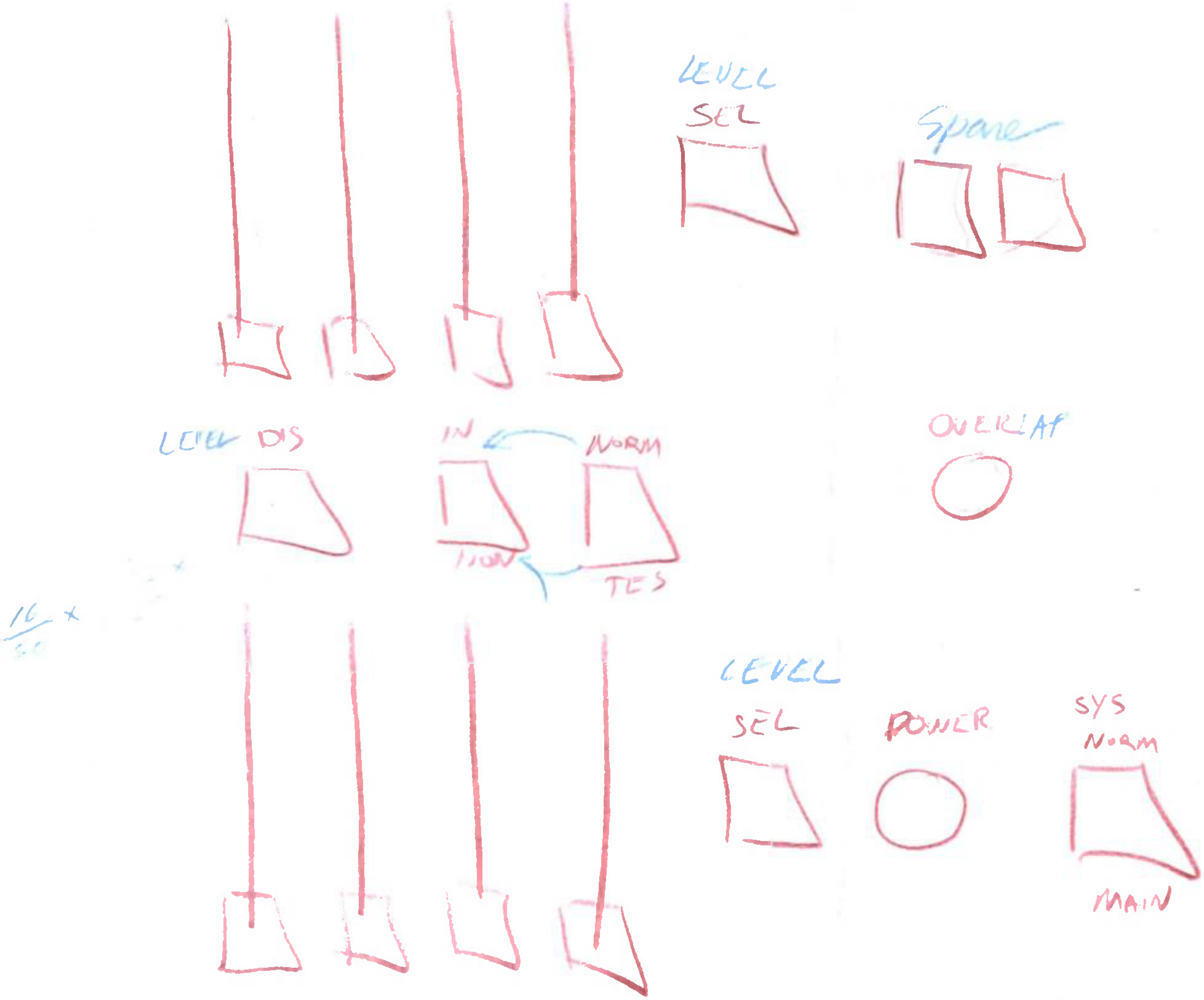
CONTROL

SELECT SCENE	SELECT NODE	DISPLAY PHASE	ART	MOVE PARAM
FETCH KF	MAKE KF	DELETE KF	MOVE KF	MOVE ALL KF
SFS	FS	SF	LINEAR	HOLD
RSFS	RFS	RSF	RLINEAR	PLINEAR
DELETE FAIR	INSERT	FLIP	PUSH ↓	XCNG ↕

ANIMATE

←	↑	↓	→

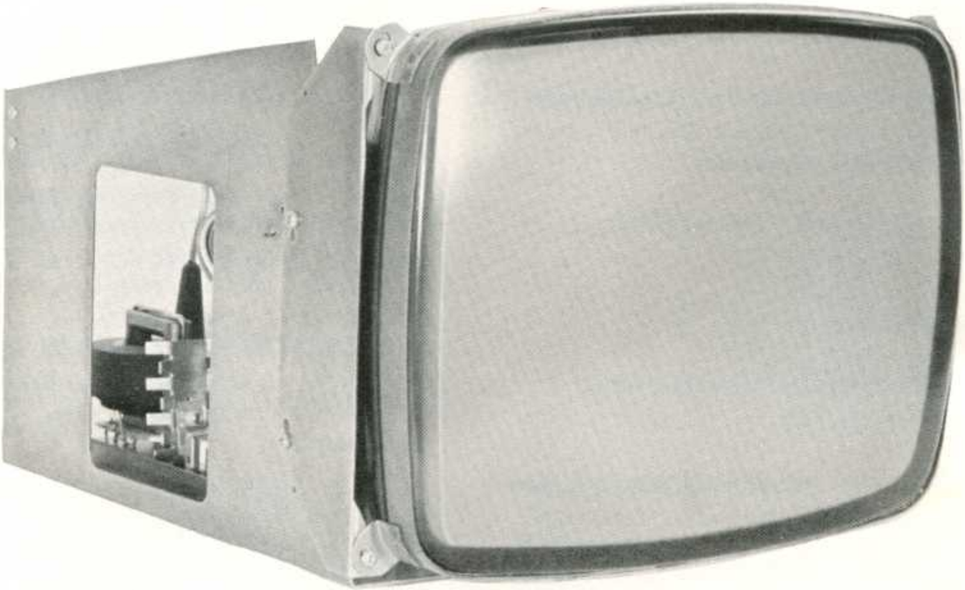
David Allred



BELL & HOWELL - FERNSEH

DISPLAY DEVICES

BHD-1200
Series



12" Video Display

FERNSEH INC.

the Video Corporation of
Bell & Howell and Robert Bosch

BHD-1200 Series
Twelve-Inch Video Display Monitors

Features

- **Accepts Industry-Standard 10-Pin Input Connector (Custom Connector Configurations Available)**
- **Thick-Film Hybrid Circuitry Provides Increased Reliability, Reduced Size, Lower Cost, and Easier Custom Modification than Competitive Units**
- **Low Current Consumption**
- **Industry-Standard Mounting Holes, CRT Alignment, and Input Connector Location (Custom Mechanical Packaging Available)**
- **Accepts TTL or (Optional) Composite Video Input**
- **Dynamic Focus Option**
- **Polished, Bonded Etched, and Direct Etched CRT Faceplates Available**
- **Wide Range of Standard EIA Phosphors Available**

General

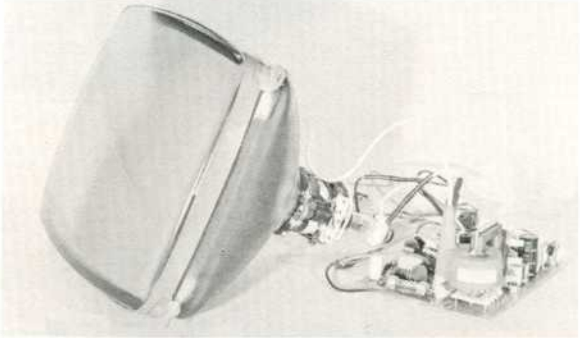
The Bell & Howell-Fernseh BHD-1200 is a series of 12-inch monochrome television monitors designed for use in data display terminals. In its normal configuration, the BHD-1200 can be mechanically and electrically fitted to standard data terminals without modification, but can also be manufactured to meet custom specifications. The BHD-1200 is suitable for use in industrial, computer, medical, and specialized applications where state-of-the-art stability and performance are required. Entirely solid-state (except for the picture tube), the BHD-1200's corner focus, resolution, bandwidth, and geometry have been optimized to accommodate the most critical display requirements. Plug-in circuit boards can be easily removed for testing and maintenance.

Plug Compatibility

The BHD-1200 Series is designed to accept standard video display input connectors on a pin-for-pin basis, allowing integration with established data terminals without extensive wiring and connector changes. At the same time, Bell & Howell-Fernseh Display Devices is prepared to design and manufacture, in suitable quantities, special units with custom connector configurations.

Thick-Film Hybrid Circuitry

The BHD-1200 is the first data display monitor known to incorporate thick-film hybrid technology as a standard feature. The advantages of these devices are well known: replacement of dozens of individual components by a single hybrid chip and simplified circuit re-design to accommodate custom system interface requirements, such as special polarities and impedance values. Possibly the most significant advantage of hybrid devices -- increased reliability -- is assured by the automated diagnostic testing performed on each device by the original manufacturer.



Kit Form Option

Fully assembled, completely operational kit form for specialized applications, may be ordered on request.

Low Current Consumption

With current consumption of only 1.2 amp, the BHD-1200 operates at minimum temperature levels and does not present excessive loading on a standard 12 VDC power source.

Modular Packaging

All deflection and video processing electronics are mounted on a detachable plug-in P.C. board for easy serviceability. In addition, the overall mechanical design of the BHD-1200 meets industry standards for 12-inch displays in terms of mounting points, connector position, and CRT alignment, centering, and tilt angle.

Varied Input Signals

As input, the BHD-1200 can accept either TTL levels (H-drive, V-drive, and TTL video), or, with the addition of one plug-in hybrid module, composite video. The composite video module can be added to the unit at any time.

Phosphor Options

The BHD-1200 is normally provided with EIA P4 faceplate phosphor, but can be supplied with P31, P39, P42 or other phosphors on request.

Power Supply Options

While the BHD-1200 normally requires 12 VDC for operation, an AC power supply (105, 120, 220, or 240 VAC switchable or tap selectable) is available as an option.

Scan Frequency Options

16,200 Hz, 18,600 Hz, or other horizontal scan frequencies are available on request.

Dynamic Focus Option

A fixed dynamic focus option, which permits optimization of corner focus, is available for all units in the BHD-1200 Series. In operation, this unit applies a dynamic voltage to the focus electronics of the CRT to sharpen characters in the corners of the display.

Faceplate Finish Options

The BHD-1200 can be ordered with polished, bonded etched, or direct etch faceplates.

Specifications

ELECTRICAL

Cathode Ray Tube 12-in. (diagonal measure), 74-sq. in. viewable area, 90° deflection angle, P4 phosphor and polished faceplate is standard

Power Input 12 VDC @ 1.2 A or 110/220 VAC 50/60 Hz

Input Signals TTL (standard) 4.0 (±1.5) V; sync positive at edge connector; input impedance: video, 75 Ω; vertical and horizontal sync, > 2 K Ω
Composite video (optional) 0.5 to 2.5 V P-P; sync negative; input impedance 75 Ω

Video Response 10 Hz to 22 MHz, ±3 dB

Pulse Rise Time 30 V rise in 20 nsec

Resolution 900 lines center, 800 lines corners with dynamic focus option

Geometric Distortion < 2%

High Voltage 12 KV @ 50 μA nominal

Horizontal Blanking 11 μsec nominal

Vertical Blanking 900 μsec nominal

Scan Frequency Horizontal: 15,750 (±500) Hz is standard
Vertical: 50 or 60 Hz is standard

Controls Internal: Vertical size, vertical linearity, horizontal size, horizontal linearity, raster centering, vertical hold, horizontal hold, contrast, brightness
External: Brightness and contrast controls (optional)

10 Pin Input Connector Mating Connectors, Amphenol 225-21031-101, Cinch 250-10-30-170, Viking 25V 105/1-2, or Industry-Standard 10-pin edge connector equivalent.

MECHANICAL

Dimensions 9-in. high X 11.5-in. wide X 12.44-in. deep (230 X 292 X 316 mm)

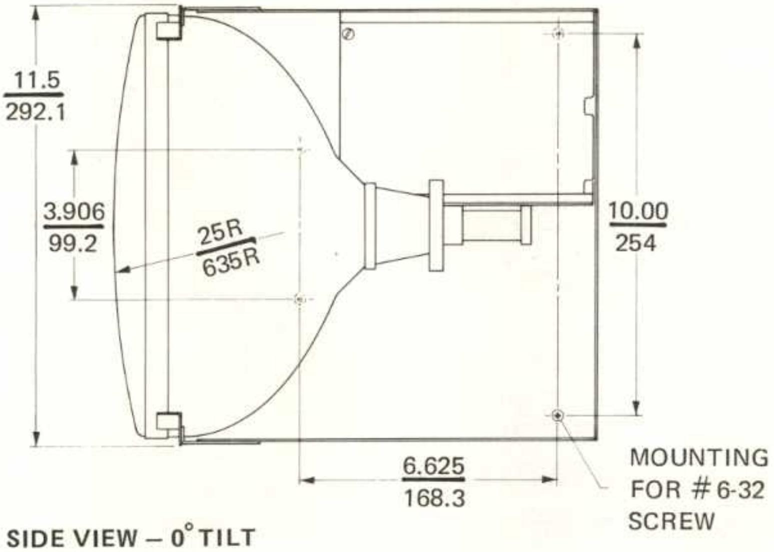
Weight 16 lb (7 Kg)

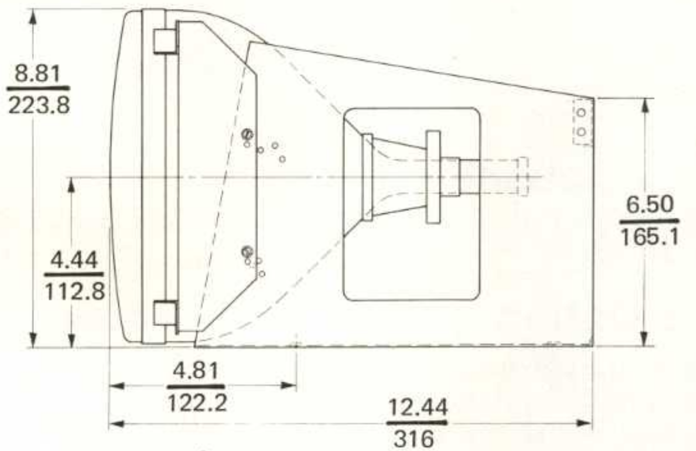
ENVIRONMENTAL

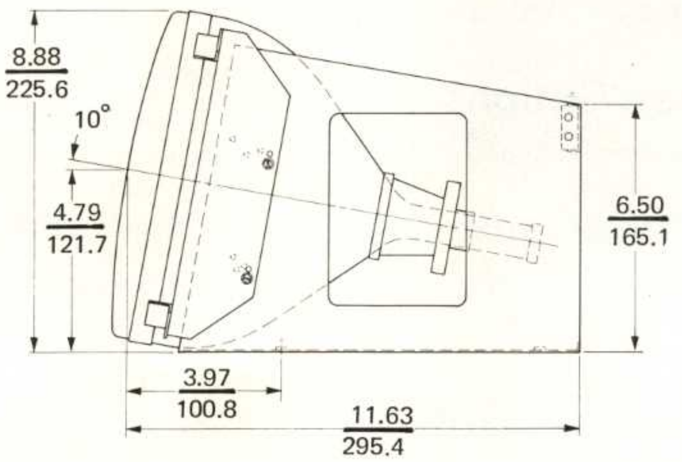
Operating Temperature: 0 to 55° C (32 to 130°F)
Altitude: up to 10,000 ft (3048 m)
Humidity: 10 to 90% (non-condensing)

Storage Temperature: -40 to +65°C (-40 to 150°F)
Altitude: up to 40,000 ft (12,192 m)
Humidity: up to 95% (non-condensing)

BHD-1200 Series Mechanical Configuration


TOP VIEW


SIDE VIEW – 0° TILT


SIDE VIEW – 10° TILT

ALL
DIMENSIONS

INCHES
MILLIMETERS

4° & 7½° & 10° TILT ANGLES STANDARD
CUSTOM MECHANICAL CONFIGURATIONS
AVAILABLE UPON REQUEST

FERNSEH INC.
the Video Corporation of
Bell & Howell and Robert Bosch
4000 Birch Street, Newport Beach, Calif. 92660 (714) 752-7602

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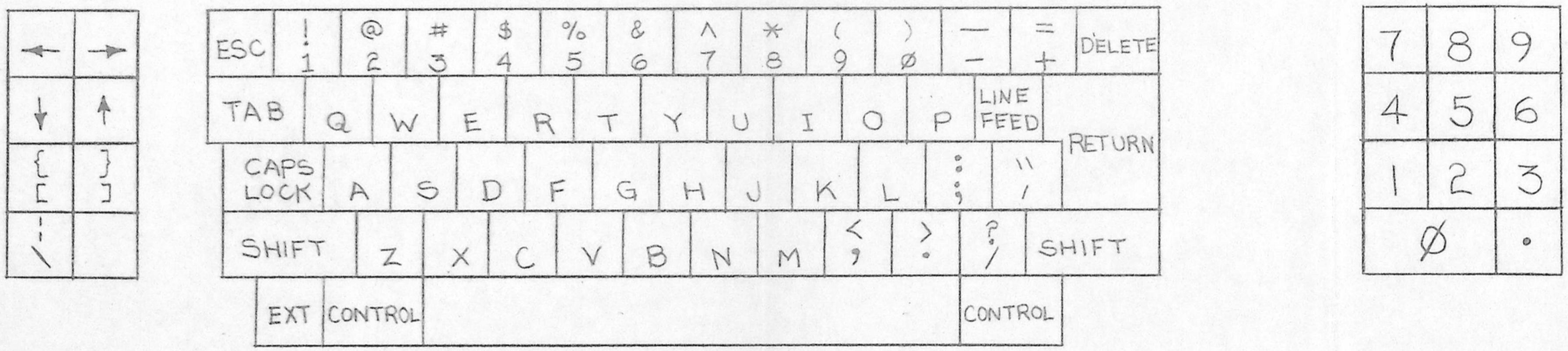
Printed in U.S.A. 12/79 5M TPB-3350



COMPUTER IMAGE CORP. DENVER, CO.

SCALE NONE	REVISIONS	BY	DATE
DATE 1-12-81			
DR'N GSH CH'D			
AP'VD			

TITLE SYSTEM IV
KEYBOARD

NO

Special Chars - RCVD by terminal

CR return cursor to BOL
lf If C not on last line, drop down one
If on last line, scroll up, clear new line. drop one l.
~~Bell ^G ring bell~~

DGC	esc code	function	
07 ^G		Bell	
14 ^L	esc j	Clear all	
	esc J	Clear EOP	incl. char at cursor
13 ^K	esc K	Clear EOL	" " "
16 ^N	esc R A	Start Blink field	
17 ^O	esc R @	End Blink field	
27 ^W	esc A	Cursor up if not at top	
32 ^Z	esc B	Cursor down if not at bottom	
31 ^Y	esc D also ^H	Cursor left if not at edge = BKSP	
30 ^X	esc C	Cursor right if not at edge	
	esc H	Cursor home (U.L. corner)	
	esc Y line Col	Set position	Line# is SP..7
5 ^E	esc a	Read position	CoL# is SP..o ($6F)
	~~esc S~~	~~Off line~~	~~If not on line to~~
	~~esc T~~	~~eclipse - on line~~	~~eclipse, doesnt~~ check
	~~esc U~~	~~RPU - on line~~	~~Any input~~

~~Keyboard ONLY~~ [O, E, R] w. CtrL & shift
~~Recognizes esc~~ ~~[S, T, U]~~ and doesn't send on
~~All other Chars~~ - pass on to [CRT, ~~eclipse, RPU~~]

Shift	CtrL	O	off line
Shift	CtrL	E	on line to eclipse
Shift	CtrL	R	on line to RPU
Shift	CtrL	S	Show shaft encoder data (hit again to clear)

Cherry Switch

MAIN POWER SUPPLY

Qty 1/sys
T72 -11M1
21

SWITCH POS	label
1	+5VA
2	+5VB
3	-5VA
4	-5VB
5	+ 15V
6	- 15V
7	+ 12V

MUP

Qty 4/sys 1 of 8
L20 -17M1
9 Ter

SWITCH POS	label
1	NORMAL
2	DISPLAY 1
3	DISPLAY 2
4	DISPLAY 3
5	DISPLAY 4
6	DISPLAY 5

SWITCH POS	label
1	ANALOG
2	DIG 2
3	DIG 3
4	DIG 4
5	DIG 5

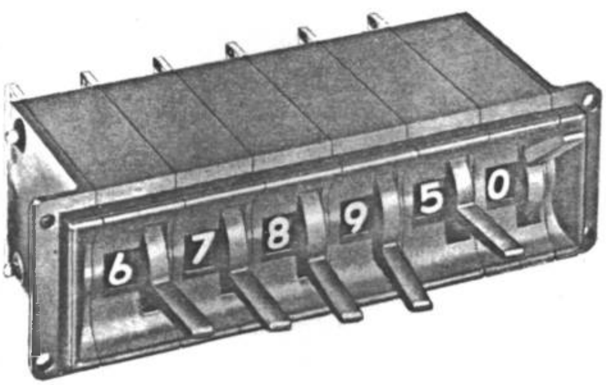
Color Controller

Switch Pos	label
1	ACT 1
2	ACT 2
3	ACT 3
4	ACT 4
5	ACT 5

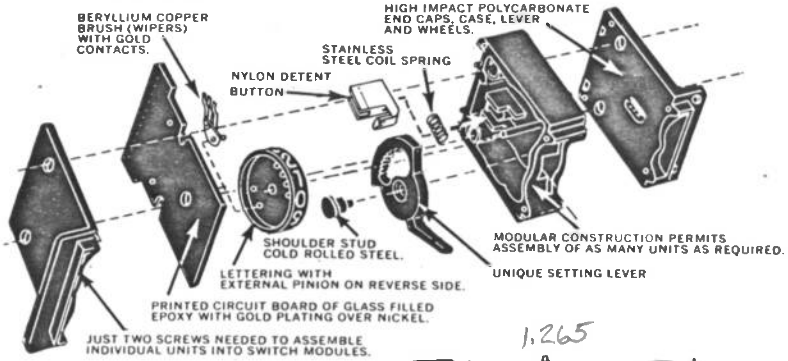
series L-20 leverwheel

L-20 BACK MOUNT SUBMINIATURE LEVERWHEEL SWITCHES

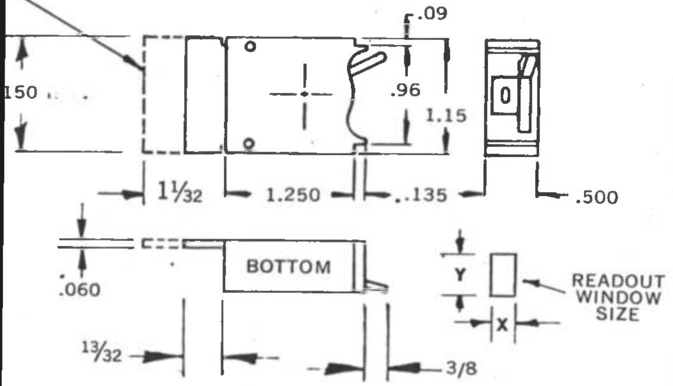
LEVERWHEEL ®

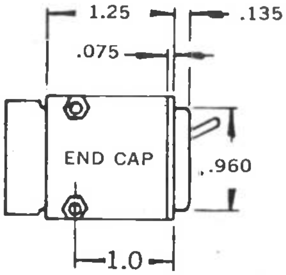


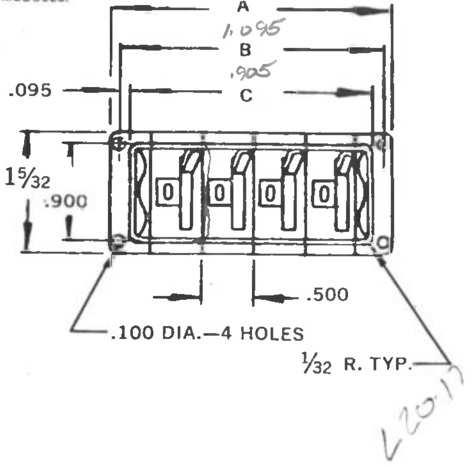
Available in 2, 8, 10 and 12 positions with widest range of output codes. Dial characters are .200" high on 2, 8 and 10 position models and .160" high on 12 position. This type of leverwheel can be furnished with extended printed circuit board to provide mounting of other components. Spacers are available in choice of 1/16", ¼" and ½" width with legends such as decimal points. Vertical lines and other symbols hot stamped on spacers. Standard finish is either black gloss or matte. Other colors available on special order. Stops may be inserted to control dial rotation as required.


BERYLLIUM COPPER BRUSH (WIPERS) WITH GOLD CONTACTS.
HIGH IMPACT POLYCARBONATE END CAPS, CASE, LEVER AND WHEELS.
STAINLESS STEEL COIL SPRING
NYLON DETENT BUTTON
MODULAR CONSTRUCTION PERMITS ASSEMBLY OF AS MANY UNITS AS REQUIRED.
SHOULDER STUD COLD ROLLED STEEL.
UNIQUE SETTING LEVER
LETTERING WITH EXTERNAL PINION ON REVERSE SIDE.
PRINTED CIRCUIT BOARD OF GLASS FILLED EPOXY WITH GOLD PLATING OVER NICKEL.
JUST TWO SCREWS NEEDED TO ASSEMBLE INDIVIDUAL UNITS INTO SWITCH MODULES.

EXTENDED PANEL (Option available on some codes)

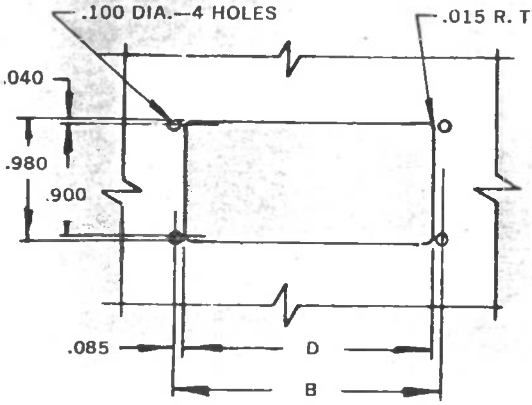






POSITIONS	Readout Window Size	Dial Character Height
2, 8 & 10	X = .205" Y = .230"	.200"
12	X = .205" Y = .205"	.160"

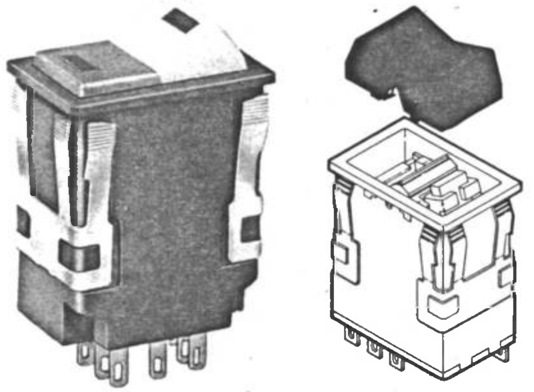
T-20, T-24 & L-20 RECOMMENDED PANEL CUT-OUT



Number of Modules	A	B	C	D
1	1.265	1.095	.905	.925
2	1.770	1.600	1.410	1.430
3	2.275	2.105	1.915	1.935
4	2.780	2.610	2.420	2.440
5	3.285	3.115	2.925	2.945
6	3.790	3.620	3.430	3.450
7	4.295	4.125	3.935	3.955
8	4.800	4.630	4.440	4.460
9	5.305	5.135	4.945	4.965
10	5.810	5.640	5.450	5.470

Positions in assembly are numbered from left to right.
For assemblies with more than 10 modules, consult factory.

ELECTRONIC CONTROL ROCKER SWITCHES


Rockers ordered separately

AML26 . . . LED Display

AML26 rocker switches are identical to the AML24 series, except they are furnished with high efficiency LED indication with optional diode protection. The 5 and 15 VDC devices have an internal resistor to maintain current at a nominal 20 mA. The rectangular LED's provides a flush display area and wide viewing angle.

Refer to page 5 for LED application information.

Rocker operators are ordered separately. They are available in nine colors and have a "window" for the LED. Refer to AML56 (page 26).

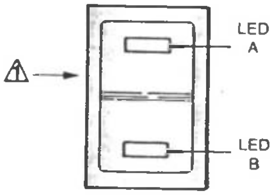
AML26 has the same electrical specifications, circuitry and operating action options as AML24, except it features LED illumination.

ORDERING GUIDE—AML26 ROCKER SWITCHES—ELECTRONIC CONTROL/LED DISPLAY

AML26 F B B 2 AA 01 R X

HOUSING TYPE	BEZEL COLOR	LED VOLTAGE	TERMINAL TYPE/ DIODE PROTECTION	CIRCUITRY CODES	OPERATING ACTION	LED COLOR (LED A)	LED COLOR (LED B)
F 1 LED **G** 2 LED's	**B** Black	**B** Non-Resistor* **C** 5.0 V **E** 15.0 V	**2** .110 x .020 (Solder or Quick-Connect) **3** .025 x .025 (Printed Ckt., Wire Wrap, or Push-On) **8** .110 x .020 W/Diode protection for LED **9** .025 x .025 W/Diode protection for LED	Insert code letters and add prices, as shown in Circuitry Chart on page 22 LED version available only with **AA** **BA** **CA** **DA** circuitry	Insert code numbers from Operating Action Chart below	**R** Red **Y** Yellow **G** Green **X** No LED	**R** Red **Y** Yellow **G** Green **X** No LED

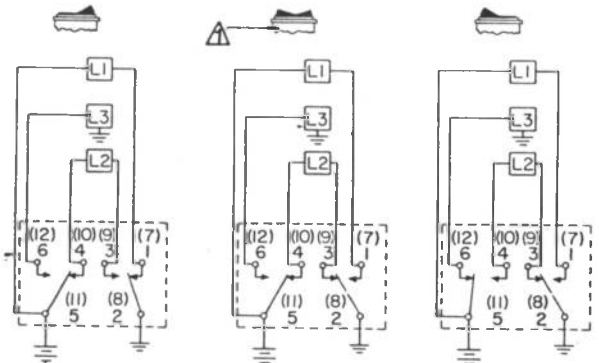
*See LED application information for devices without current-limiting resistor, page 5.



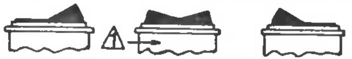
▨ Normal Stock Item

HOW TO WIRE FOR ON-ON-ON CIRCUITRY

Schematic shows wiring for type **CA** and **DA** circuitry when specified with a 3-position switch. Numbers in parentheses indicate additional circuitry available when **CC** or **DC** is specified.



LOAD 1 L1 ON   LOAD 2 L2 ON   LOAD 3 L3 ON

OPERATING ACTION		
		
	2-POSITION:	
Maint.	01 None	Maint.
Mom.	02 None	Maint.
Maint.	03 None	Mom.
	3-POSITION:	
Maint.	04 Maint.	Maint.
Mom.	05 Maint.	Mom.
Maint.	06 Maint.	Mom.
Mom.	07 Maint.	Maint.

⚠ The "MICRO SWITCH" identification is shown on this side of the switch housings.

TYPICAL LISTING

AML26FBB2AA01RX

Rectangular device; illuminated with one LED, this device has a black bezel, .110 x .020 terminals; with one circuit ON and one circuit OFF in each extreme operator position (maintained).

The STD BUS

by Roger Born

Presented at IEEE Workshop on Microcomputers, April 1979

ABSTRACT

The STD BUS is a microprocessor bus developed by Matt Biewer of Pro-Log Corporation. The bus has four sections; power distribution, an eight-bit bi-directional Data Bus, a 16-bit Address Bus and a Control Bus. All data and address lines are tri-state buffered. Control lines include controls for memory and I/O, bus access, interrupts, and lines for CPU actions. Power consists of +5 volts for logic and +12 volts for auxiliary power.

The STD BUS has industry acceptance and support, being sourced by over eight firms including Pro-Log, meets the needs of today and the future with regard to eight-bit systems and with small modifications can be adapted to the needs of 16-bit or larger systems. The card size is ideal for the industrial control environment. Pro-Log is inviting other manufacturers to join in a voluntary standards group.

STD means simple-to-debug, simple-to-develop and swift-to-deliver. It is also an abbreviation for the word standard, as it is the microprocessor system bus adopted as a standard by Pro-Log and others. These companies are offering a full set of compatible cards that will interface with the STD BUS. Figure 1 shows Pro-Log's 7000 Card set interfaced using the STD BUS. The system is built around a standard bused motherboard which allows any card to work in any slot. The Bus handles all internal communications facilitating orderly signal flow from card to card. You can change the function of your system, the memory type, even the microprocessor type by simply exchanging one card for any other. The STD BUS is fifty-six lines wide and is compatible with Pro-Log's standard 4½" by 6½" edge connected cards. The question is, might it also be a candidate for national consideration as a standard for microprocessors used in industrial control?

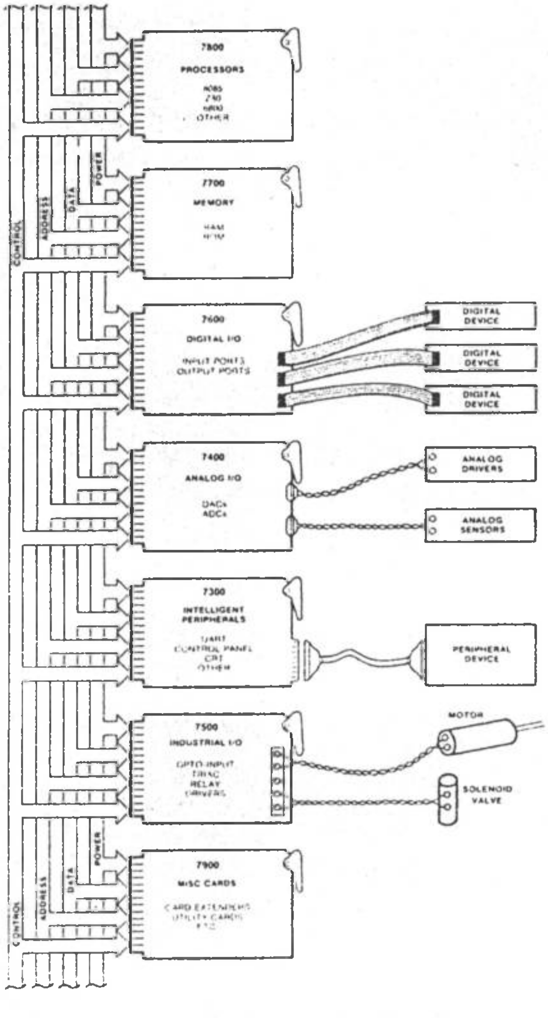


Figure 1 7000 System Concept

POWER DISTRIBUTIO

The STD BUS contair
Bus, Address Bus, Co
Bus (refer to Figure 2)
Supply is +5 volts. Two
at one card edge to al
and sufficient width.
connector, single opp
This supplies the tw
needed for analog
controls. Next in from
are bused ground lin
bused to provide logi
and fifty-four are buse
A second logic voltag
pins five and six. This
strate voltage for dyn

DATA BUS

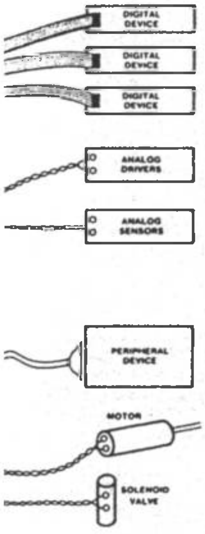
All compatible functi
the Bus connectors.
and uses pins 7 and
using tri-state buffer

ADDRESS BUS

The next sixteen pins
sixteen line address
address lines are or
higher address lines
with the Data Bus, a
Bus are through tri-

	PIN
LOGIC POWER BUS	1 3 5
DATA BUS	7 9 11 13
ADDRESS BUS	15 17 19 21 23 25 27 29
CONTROL BUS	31 33 35 37 3 4 4 4 4 4 5
POWER BUS	5 5

*Low Level Activ



POWER DISTRIBUTION

The STD BUS contains a Logic Power Bus, Data Bus, Address Bus, Control Bus and Analog Power Bus (refer to Figure 2). The principle Logic Power Supply is +5 volts. Two bused pin pairs are provided at one card edge to allow both ample contact area and sufficient width. At the opposite end of the connector, single opposed pins supply +12 volts. This supplies the twenty-four volts likely to be needed for analog interfaced and industrial controls. Next in from the card edge, at each end, are bused ground lines. Pins three and four are bused to provide logic ground and pins fifty-three and fifty-four are bused to provide auxiliary ground. A second logic voltage (-5 volts DC) is provided at pins five and six. This source could provide a substrate voltage for dynamic memories.

DATA BUS

All compatible functions are grouped together on the Bus connectors. The Data Bus is bidirectional and uses pins 7 and 14. Data lines are interfaced using tri-state buffer drivers.

ADDRESS BUS

The next sixteen pins, pins 15 through 30, provide a sixteen line address bus. The lower order eight address lines are on odd numbered pins and the higher address lines are on even numbered pins. As with the Data Bus, all connections to the Address Bus are through tri-state buffer drivers.

CONTROL BUS

Pins 31 and 32 provide write and read commands respectively. These signals are ANDed with the memory request on pin 34 to address memory or the I/O request on pin 33 to address Input or Output. Pins 35 and 36 provide an I/O and memory expansion capability. Expansion may be implemented in different ways, the simplest being use of the memory expansion line as a 17th bit to be decoded on each memory card. A processor card on-board port with an output latch could be used to select the upper or lower bank of memory. The I/O expansion line allows a subroutine using absolute I/O port addresses to be applied to more than one set of I/O devices by simply swapping banks. Pin 37 provides refresh timing information for dynamic memories. The Z80 microprocessor has a refresh register on the CPU chip; in other systems, the refresh address counter would be implemented separately on the processor card or other auxiliary card.

Pins 42 and 41 provide a bus request and bus acknowledge, allowing secondary controllers access to data and address buses. This set of signals is necessary for implementation of Direct Memory Access (DMA) operations and facilitates multiprocessing.

Pins 44 and 43, interrupt request and interrupt acknowledge, provide a means for implementing a fixed priority interrupt scheme such as the 8080 microprocessor interrupt set. used with the non-maskable interrupt signal (pin 46), one level of

	COMPONENT SIDE				CIRCUIT SIDE			
	PIN	MNEMONIC	SIGNAL FLOW	DESCRIPTION	PIN	MNEMONIC	SIGNAL FLOW	DESCRIPTION
LOGIC POWER BUS	1	+5V	In	+5 Volts DC (Bussed)	2	+5V	In	+5 Volts DC (Bussed)
	3	GND	In	Digital Ground (Bussed)	4	GND	In	Digital Ground (Bussed)
	5	-5V	In	-5 Volts DC	6	-5V	In	-5 Volts DC
DATA BUS	7	D3	In/Out	Low Order Data Bus	8	D7	In/Out	High Order Data Bus
	9	D2	In/Out	Low Order Data Bus	10	D6	In/Out	High Order Data Bus
	11	D1	In/Out	Low Order Data Bus	12	D5	In/Out	High Order Data Bus
	13	D0	In/Out	Low Order Data Bus	14	D4	In/Out	High Order Data Bus
ADDRESS BUS	15	A7	Out	Low Order Address Bus	16	A15	Out	High Order Address Bus
	17	A6	Out	Low Order Address Bus	18	A14	Out	High Order Address Bus
	19	A5	Out	Low Order Address Bus	20	A13	Out	High Order Address Bus
	21	A4	Out	Low Order Address Bus	22	A12	Out	High Order Address Bus
	23	A3	Out	Low Order Address Bus	24	A11	Out	High Order Address Bus
	25	A2	Out	Low Order Address Bus	26	A10	Out	High Order Address Bus
	27	A1	Out	Low Order Address Bus	28	A9	Out	High Order Address Bus
	29	A0	Out	Low Order Address Bus	30	A8	Out	High Order Address Bus
CONTROL BUS	31	WR*	Out	Write to Memory or I/O	32	RD*	Out	Read to Memory or I/O
	33	IORQ*	Out	I/O Address Select	34	MEMRQ*	Out	Memory Address Select
	35	IOEXP*	In/Out	I/O Expansion	36	MEMEX*	In/Out	Memory Expansion
	37	REFRESH*	Out	Refresh Timing	38	MCSYNC*	Out	CPU Machine Cycle Sync.
	39	STATUS 1*	Out	CPU Status	40	STATUS 0*	Out	CPU Status
	41	BUSAK*	Out	Bus Acknowledge	42	BUSRQ*	In	Bus Request
	43	INTAK*	Out	Interrupt Acknowledge	44	INTRQ*	In	Interrupt Request
	45	WAITRQ*	In	Wait Request	46	NMIRQ*	In	Non-Maskable Interrupt
	47	SYSRESET*	Out	System Reset	48	PBRESET*	In	Push Button Reset
	49	CLOCK*	Out	Clock from Processor	50	CNTRL*	In	AUX Timing
	51	PCO	Out	Priority Chain Out	52	PCI	In	Priority Chain In
POWER BUS	53	AUX GND	In	AUX Ground (Bussed)	54	AUX GND	In	AUX Ground (Bussed)
	55	AUX +V	In	AUX Positive (+12 Volts DC)	56	AUX -V	In	AUX Negative (-12 Volts DC)

*Low Level Active Indicator

Figure 2 STD BUS Pinout

priority interrupt is provided. Vectoring (e.g., by placing an 8080 Restart instruction on the data bus at interrupt acknowledge time) would be required for further interrupt expansion. The nonmaskable interrupt also provides for a power failure interrupt. Pins 51 and 52, used in conjunction, provide for a daisy-chain. Priority is established by physically positioning the highest priority card to the right of the next highest and so on. Priority I/O operations, interrupt driven applications and possible implementation of multi-processors are served by these two lines.

The two maskable interrupts as well as the serial input and output of the 8085 microprocessor are brought out on a processor card DIP connector in Pro-Log's implementation of this microprocessor.

Machine Cycle Sync, pin 38, is a three state active low processor output signal that occurs once during each processor machine cycle. A machine cycle is defined as the sequence that involves addressing, data transfer and execution. Machine Cycle Sync defines the beginning of the machine cycle. The exact nature and timing of this signal is microprocessor dependent. Status 1, pin 39, and status 0, pin 40, provide timing information related to special machine cycle operations. Where specifically available, status 1 is considered to be a signal to identify instruction fetch. Wait Request, pin 45, is an active low input line to the processor that suspends processor operations as long as it remains low. Normally, a valid address would be held on the address lines during the wait. The wait request allows slow access time devices to be used on the same bus as a faster processor.

System Reset, pin 47, provides a debounced reset signal to all cards in the system requiring initial system resetting. Pin 48, Push Button Reset, allows the source of the reset condition to be other than the processor card; it provides an active low input line to the system reset circuit. Pin 49 provides a buffered processor clock signal used for system synchornization or as a general clock source. Pin 50 provides a circuit for auxiliary clock timing; it may be a multiple of the processor clock signal or a real time clock signal. It allows slow speed devices to use a common clock.

DESIRABLE CHARACTERISTICS OF A STANDARD

Industry acceptance and support is required for a standard to be a truly living standard. To be useful, a standard must meet the needs of today as well as the projectable future. If a standard did not meet at least the needs of today, it would have no adherence. Lastly, a standard must be enforceable and there must be a group to monitor the enforcement; a group such as the IEEE, ANSI and JEDEC or an association of users.

INDUSTRY ACCEPTANCE AND SUPPORT

The STD BUS is off to a good start with both Pro-Log and Mostek providing a full set of cards compatible with the Bus. Industry demand for the card sets and the STD BUS are five times greater than Pro-Log first projected, and enthusiasm continues to build. Cards from other manufacturers are coming on fast. Analog Devices and Data Translation are making Analog to Digital and Digital to Analog cards. Microcomputer Applications has announced a priority interrupt and real time clock card as well as USART card. Micro-Link who has a wide range of support cards for wire-wrapped Pro-Log systems has announced it will convert its cards over to the new STD BUS, as well as add some other cards. Ziatech has indicated it will build an IEEE 488 Bus interface card. Rumblings have been heard from others.

The STD concept is freely available to the industry. The Bus is in the public domain. It is neither patented, trade marked nor copywrited.

MEETS THE NEEDS OF TODAY

The STD Bus is universal since it is not tied to the architectural quirks of any one microprocessor. Currently the 8085, Z80 and 6800 are implemented. Adequate signals are available to handle any other popular CPU. The STD BUS avoids the ambiguities so prevalent in other widely used microprocessor buses since all of the lines have been defined. In addition to the fundamental system controls for memory and I/O, the STD BUS enables such operations as memory expansion, memory mapped I/O, dynamic memory refresh, DMA, multiprocessing, single stepping, slow devices, power fail, fixed priority and daisy-chain interrupts.

Significant to meeting the needs of the industrial control user is the card size and shape supported by the STD BUS. STD Cards are 4½" wide and, as provided by Pro-Log, 6½" long. Supported along their long sides, they are well adapted for use in harsh environments. Enclosures for larger cards are generally expensive and may be mechanically weak. System maintainability is critically dependent upon module size as is first cost. Large complex multi-function cards significantly impact first cost unless all functions are used and impact maintainability in that failure of any card function is likely to result in a complete replacement. STD Cards will be typically single logical-function encouraging board-swapping trouble shooting, reducing spares inventory and keeping initial system costs aligned to functional requirements. This will become more important as additional circuits are put on single chips. Cooling air can be more effectively applied to the smaller cards which is important as power dissipation density increases with increased circuit density.

FUTURE NEEDS?

Crystal ball gazing i
The data processin
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power lines be used
(1) This would easil
four bytes of data.

Determining the futu
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difficult unless one
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Since the industrial
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the attention of the

D SUPPORT

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set of cards compat-
and for the card sets
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siasm continues to
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ata Translation are
Digital to Analog
ons has announced
e clock card as well
has a wide range of
d Pro-Log systems
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some other cards.
ld an IEEE 488 Bus
e been heard from

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Y

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increased circuit

FUTURE NEEDS?

Crystal ball gazing is fun if not always productive. The data processing use of microprocessors is more readily predictable. The trend seems to be toward larger memories both in word size and number of words. This trend is supported by the semiconductor manufacturers (their principal income is from the sale of memories and development systems). Some changes would be required on the STD BUS to meet the needs of the larger word size. It has been suggested that the -5 Volt power lines be used to define data bus multiplexing. (1) This would easily provide multiplexing of up to four bytes of data.

Determining the future trends in microprocessors, oriented toward industrial control, is a little more difficult unless one predicts no future. All microprocessor development is oriented toward serving the data processing market. The needs of the industrial control user is attempting to minimize memory. Since the industrial control user can, in fact, get by with very little memory, his needs do not command the attention of the semiconductor manufacturer. The STD BUS is aimed at the industrial control user. Hopefully, it will meet his needs for decades to come.

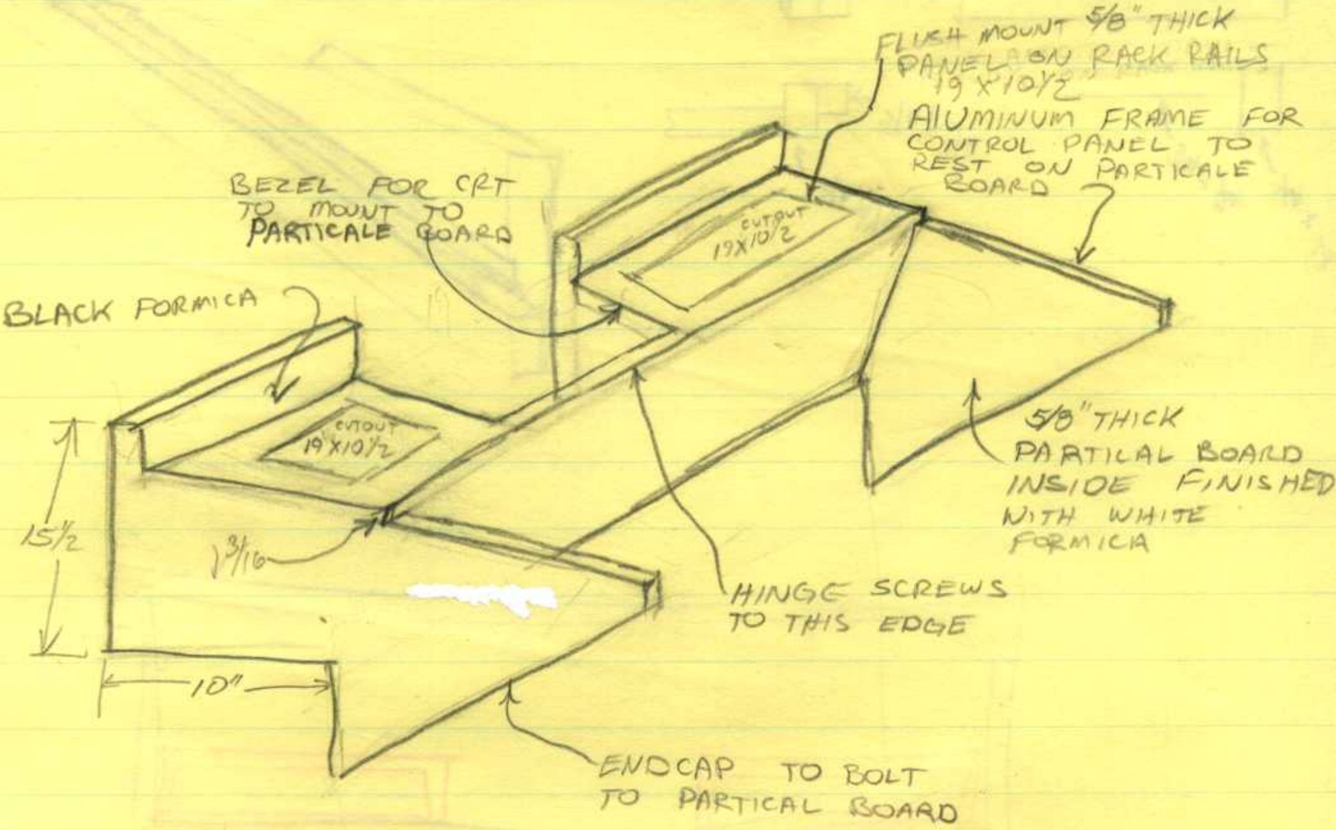
ENFORCEABLE

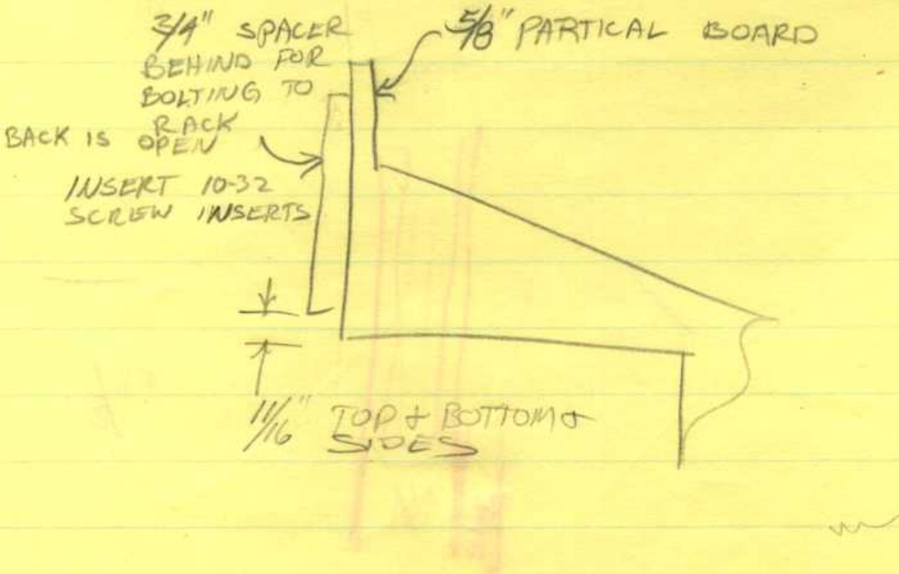
Pro-Log invites manufacturers of STD compatible cards to join a manufacturer's organization for the purpose of monitoring adherence, as well as adapting the STD BUS to technological change. Recognition by the IEEE standards committee would be welcomed.

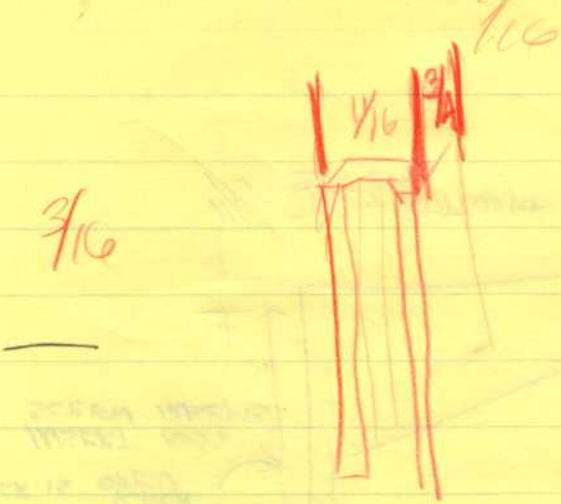
BIBLIOGRAPHY

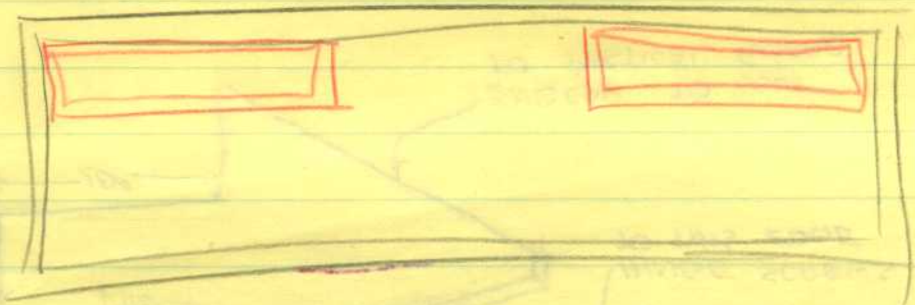
1. Britton, Keith; "The STD BUS; A Critical Look At a Proposed New Standard;" Dr. Dobb's Journal of Computer Calisthenics & Orthodontia, No. 30, 1979. Pages 34-39.
2. Mhater, Girish; "Universal Microprocessor Bus: STD BUS Could Be The Answer."
3. Series 7000 STD BUS Technical Manual; Pro-Log Corporation, March 1979.

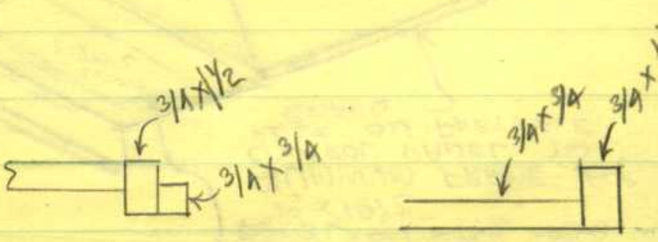
CONTROL PANEL

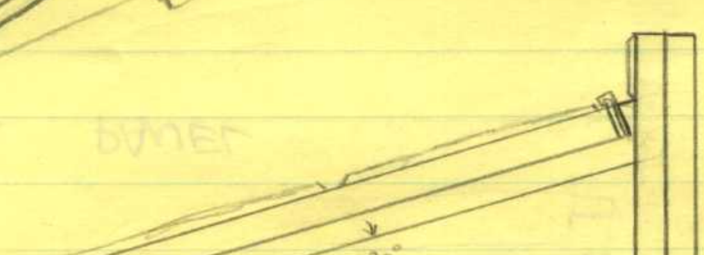

FLUSH MOUNT 5/8" THICK PANEL ON RACK RAILS 19 X 10 1/2
ALUMINUM FRAME FOR CONTROL PANEL TO REST ON PARTICALE BOARD
BEZEL FOR CRT TO MOUNT TO PARTICALE BOARD
CUTOUT 19X10 1/2
BLACK FORMICA
CUTOUT 19X10 1/2
15 1/2
3/16
5/8" THICK PARTICAL BOARD INSIDE FINISHED WITH WHITE FORMICA
HINGE SCREWS TO THIS EDGE
10"
ENDCAP TO BOLT TO PARTICAL BOARD

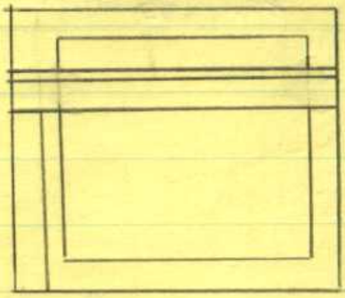

3/4" SPACER BEHIND FOR BOLTING TO RACK
5/8" PARTICAL BOARD
BACK IS OPEN
INSERT 10-32 SCREW INSERTS
11/16" TOP + BOTTOM + SIDES


7/16
1/16
3/4
3/16




3/4 x 1 1/2
3/4 x 3/4
3/4 x 3/4
3/4 x


20°



___ MOVE MOUNTING DOWELS ON MAIN CONSOLE
END CAPS. NEED TO BE MORE THAN 1"

___ WHAT ANGLE IS CRT FOR COMPUTER

___ WHERE DOES IT MOUNT

___ HOW SHOULD THE BEZEL MOUNT

___ CAN I COVER THE UPPER CONTROL PANEL WITH
BLACK FORMICA

___ DO I WANT TO

___ HOW ABOUT PUTTING A RECESSED 19"X 10½"
BLACK ANODIZED PANEL IN EACH SIDE ON
RACK RAILS, THIS WOULD ALLOW FOR EXPANSION

___ SERVICING FOR CRT ? OUT FRONT, OUT BACK ?

Continuous Hinges

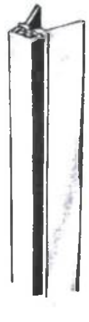
Blank Steel Continuous Hinges with Steel Pins

Can be applied by welding or by drilling screw holes to suit individual requirements.

Open Width	Length	Pin Dia.	No.	NET EACH
.035" THICK				
1¹⁄₁₆"	72"	0.085"	1577A20	$3.65
1¼"	72"	0.085"	1577A30	3.65
1½"	72"	0.085"	1577A40	3.65
.040" THICK				
1¹⁄₁₆"	48"	0.095"	1577A11	$2.40
1¹⁄₁₆"	60"	0.095"	1577A12	3.03
1¹⁄₁₆"	72"	0.095"	1577A13	3.60
1¼"	48"	0.095"	1577A14	2.40
1¼"	60"	0.095"	1577A15	3.03
1¼"	72"	0.095"	1577A16	3.60
1½"	48"	0.095"	1577A17	2.40
1½"	60"	0.095"	1577A18	3.03
1½"	72"	0.095"	1577A19	3.60
2"	72"	0.095"	1577A50	4.60
.050" THICK				
1½"	48"	0.125"	1577A21	$2.40
1½"	60"	0.125"	1577A22	3.93
1½"	72"	0.125"	1577A23	4.75
2"	48"	0.125"	1577A24	3.35
2"	60"	0.125"	1577A25	4.23
2"	72"	0.125"	1577A26	4.85
.060" THICK				
1¼"	72"	0.125"	1577A60	$5.90
1¼"	96"	0.125"	1577A70	7.80
1½"	48"	0.187"	1577A27	3.70
1½"	60"	0.187"	1577A28	4.70
1½"	72"	0.125"	1577A77	6.35
1½"	72"	0.187"	1577A29	5.60
1½"	96"	0.187"	1577A78	8.60
2"	48"	0.187"	1577A31	3.88
2"	60"	0.187"	1577A32	4.88
2"	72"	0.125"	1577A79	7.25
2"	72"	0.187"	1577A33	5.83
2"	96"	0.125"	1577A80	9.60
2½"	72"	0.125"	1577A85	8.12
2½"	72"	0.187"	1577A89	6.72
2½"	84"	0.187"	1583A23	7.40
2½"	96"	0.125"	1577A86	10.80
3"	48"	0.187"	1577A44	4.30
3"	60"	0.187"	1577A45	5.38
3"	72"	0.125"	1577A87	9.15
3"	72"	0.187"	1577A46	6.43
3"	96"	0.125"	1577A88	12.20
3"	96"	0.187"	1576A21	8.58
.075" THICK				
1½"	48"	0.250"	1576A11	$5.43
1½"	60"	0.250"	1576A12	6.75
1½"	72"	0.250"	1576A13	8.43
2"	48"	0.250"	1576A14	5.60
2"	60"	0.250"	1576A15	7.00

Open Width	Length	Pin Dia.	No.	NET EACH
.075" THICK				
2"	72"	0.250"	1576A16	$ 8.35
2"	84"	0.250"	1583A19	10.00
2"	96"	0.187"	1576A51	8.60
2½"	48"	0.250"	1577A37	5.75
2½"	60"	0.250"	1577A38	7.20
2½"	72"	0.250"	1577A39	8.80
2½"	84"	0.250"	1576A17	10.08
2½"	96"	0.250"	1576A18	11.53
3"	48"	0.250"	1576A22	5.75
3"	60"	0.250"	1576A23	7.48
3"	72"	0.250"	1576A24	8.80
3"	84"	0.250"	1576A25	10.40
3"	96"	0.187"	1576A61	10.00
3½"	48"	0.250"	1577A57	6.18
3½"	60"	0.250"	1577A58	7.40
3½"	72"	0.250"	1577A59	9.23
3½"	84"	0.250"	1576A62	10.85
3½"	96"	0.250"	1576A29	12.85
4"	96"	0.187"	1576A63	11.20
4"	96"	0.2$0"	1576A64	16.00
.090" THICK				
2"	84"	0.250"	1583A22	$15.35
3"	96"	0.250"	1583A51	19.40
4"	84"	0.250"	1583A25	18.65
5"	84"	0.250"	1583A29	20.75
.125" THICK				
3"	48"	0.375"	1577A54	$10.60
3"	60"	0.375"	1577A55	13.25
3"	72"	0.375"	1577A56	15.80
3"	84"	0.375"	1576A26	18.55
3"	96"	0.250"	1576A65	31.60
3"	96"	0.375"	1576A27	21.28
3"	96"	0.500"	1577A81	33.50
4"	72"	0.375"	1577A91	19.97
4"	84"	0.375"	1583A26	20.20
4"	96"	0.375"	1577A92	26.87
5"	48"	0.375"	1577A71	12.10
5"	60"	0.375"	1577A72	15.15
5"	72"	0.375"	1577A73	19.08
5"	96"	0.375"	1576A32	25.18
5"	96"	0.500"	1577A82	39.08
6"	72"	0.375"	1577A93	84.60
6"	96"	0.375"	1577A95	112.80
.187" THICK				
3"	96"	0.500"	1577A83	$44.68
5"	96"	0.500"	1577A84	52.08
.250" THICK				
3"	72"	0.625"	1576A44	$82.00
4"	72"	0.625"	1576A45	88.64
5"	72"	0.625"	1576A46	93.68

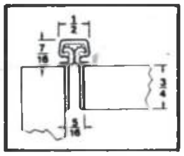
Geared Aluminum Continuous Hinges



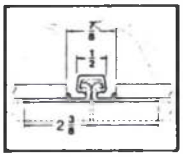
Designed for use on cabinets and equipment enclosures. Made of three precision aluminum alloy extrusions. Hinges consist of two leaves, each with an extruded gear sector, joined by a cover channel.

Rolling contact principle provides positive alignment along full length of hinge and permits 180° rotation. Door weight is absorbed by self-lubricating Delrin thrust bearings.

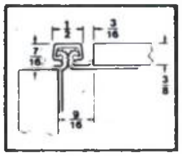
Easily mounted with simple hand tools. Reversible for right or left hand doors. All have anodized finish with a teflon lubricated joint. **Furnished blank without holes.** Holes may be punched with hand punch or drilled. Mounting fasteners are not furnished.



Type A



Type B



Type C

Type	Length	Clear Anodized No.	Clear Anodized NET EACH	Gold Anodized No.	Gold Anodized NET EACH
A	6'11"	1381A21	$24.34	1381A31	$30.28
B	6'11"	1381A22	24.34	1381A32	30.28
C	6'11"	1381A23	24.34	1381A33	30.28

Plastic Continuous Hinges

These hinges are made of tough alloyed polymers. Will not peel, bind, tarnish or corrode. Will never need lubrication. Molded-in finish never needs painting. Completely leakproof.

Furnished without pre-drilled holes. Easily installed with screws, nails, brads or staples by piercing butt sections. **Easily cut with standard shears to desired length.** Can be loaded up to 50-lbs. per inch of length without failure.

Open Width	Lgth. Ft.	Thickness	No.	NET EACH
GRAY COLOR				
1½"	25	0.125"	1588A1	$ 38.05
1½"	100	0.125"	1588A2	110.69
2"	25	0.125"	1588A4	53.33
2"	100	0.125"	1588A5	173.11
BROWN COLOR				
1½"	25	0.125"	1588A6	$ 38.05
1½"	100	0.125"	1588A7	110.68
2"	25	0.125"	1588A8	53.33
2"	100	0.125"	1588A9	173.11

---

minum doors and
ency commercial
d resist kickback
with simple hand
s. Reversible for

cision extrusions
by a cover chan-
s rolling contact
0° rotation. Door
t bearings.
stant sealed joint.
door and frame.
other areas where
minute fire rating.
steners included.

No.	NET EACH
1382A11	$35.78
1382A12	59.13
1382A13	66.71
1382A14	80.22

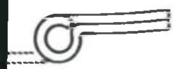
ach 2-oz. unit is
ons.
NET EACH $6.41

vy Weight
Mortise
Bronze
Hinges

eavy duty template
ave [illegible] nylon
hat [illegible] affected
ease [illegible] or heat.
ng loose stainless
l is nylon-bushed.
th screws.

No.	NET/PAIR
8034A52	$48.64
8034A58	52.08
8034A56	51.16
8034A62	51.07

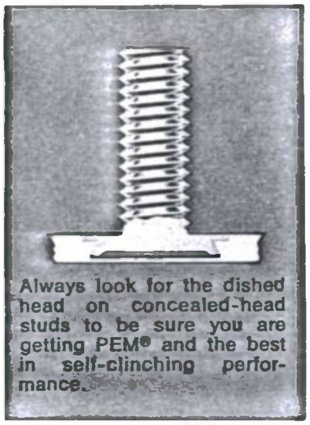
Swaged
ank Steel
ntinuous
Hinges



eaves are swaged
e half the pin diam-
minimum clearance
leaves when paral-

No.	NET EACH
1577A34	$3.88
1577A35	4.88
1577A36	5.83
1577A47	4.30
1576A33	$5.43
1576A35	8.10
1576A38	8.38
1577A41	5.75
1577A43	13.10
1577A51	5.95
1577A53	6.10
1577A67	7.38
[illegible]	12.58
[illegible]	$ 8.30
1577A66	12.58

-CARR


Always look for the dished head on concealed-head studs to be sure you are getting PEM® and the best in self-clinching performance.

PEM®

Concealed-Head, Self-Clinching Studs

PATENTED

ALUMINUM TYPE CFHA and STAINLESS STEEL TYPE CFHC
for 3/32″ thick panels or greater

ALUMINUM TYPE CHA and STAINLESS STEEL TYPE CHC
for panels as thin as 1/16″

CFHC-632-6

SPECIFICATIONS AND DESIGN DATA *(All dimensions are in inches)*

Thread Size	First Dash No.	Second Dash Number Length L—Inches ¼	⅜	½	⅝	¾	1	Blind Mounting Hole +.003 −.000	Min. Edge Dist. to Center of Hole in Panel	E ±.010	C Max.	Max. Recom. Tightening Torque in lbs. (1)	D +.003 −.000
.112-40 (4-40)	−440	−4	−6	−8	−10	−12		.172	.156	.205	.171	4¾	.120
.138-32 (6-32)	−632	−4	−6	−8	−10	−12	−16	.213	.188	.250	.212	9	.150
.164-32 (8-32)	−832	−4	−6	−8	−10	−12	−16	.290	.219	.328	.289	18	.180
.190-24 (10-24)	−024		−6	−8	−10	−12	−16	.312	.250	.350	.311	24	.203
.190-32 (10-32)	−032											32	
‡ .250-20 (¼-20)	−0420				−10‡	−12‡	−16‡	.344	.281	.385	.343	80	.261

‡ Types CHA and CHC studs are not available in this thread size.
Hole in attached part must not exceed major thread diameter plus .020″.

NOTE: (1) Maximum recommended tightening torques for aluminum studs are 60 percent of these values.

THREAD: Class 2A (MIL-S-7742B)

TYPE	MATERIAL	FINISH	INSTALL IN PANELS WITH
CHA, CFHA	2024-T4 Aluminum	None	Rockwell B-50 Hardness or less
CHC, CFHC	300 Series Stainless Steel	Passivated	Rockwell B-70 Hardness or less

BEFORE USING IN MAGNESIUM, CONSULT OUR ENGINEERING DEPARTMENT

	TYPES CHA & CHC	TYPES CFHA & CFHC
"A" Dimension	.040″ Max.	.075″ Max.
Min. Panel Thickness:	1/16″	3/32″
Min. Depth of Blind Hole*	.043	.075

Blind holes may be deeper in panels thicker than the minimums above with no adverse effect on PEM self-clinching, concealed-head stud performance.

PART NUMBER DESIGNATION: Consists of type (letters), 1st dash number indicating thread size, and 2nd dash number indicating length expressed in 1/16″.

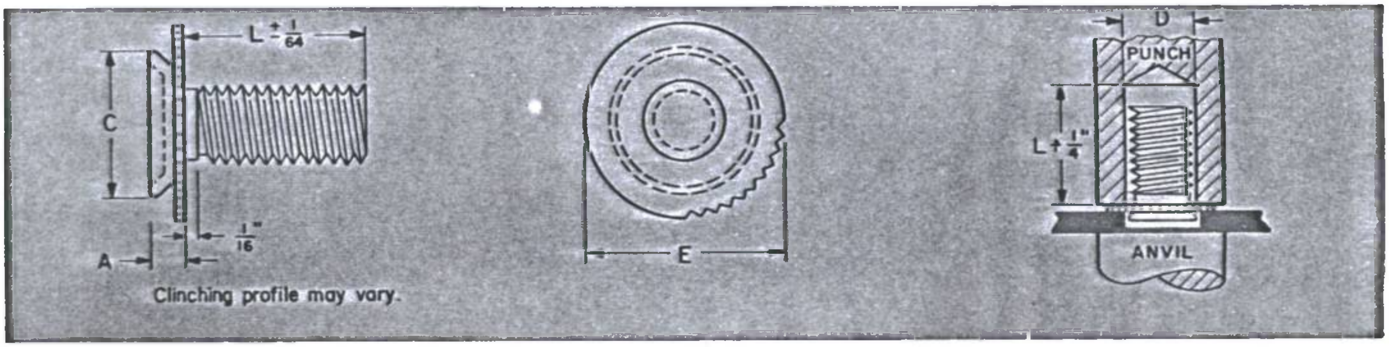
EXAMPLE: CFHC-632-6 is a passivated stainless steel concealed-head stud with #6-32 thread, 3/8″ long, for panels 3/32″ and thicker.

EXAMPLE: CHC-632-6 is a passivated stainless steel concealed-head stud with #6-32 thread, 3/8″ long, for 1/16″ thick panel.

INSTALLATION PROCEDURE

1. Mill blind hole in panel with diameter and depth as indicated slowly without forcing.
2. Place the shank of the stud in the milled hole, and squeeze the knurled head flush in panel with a hydraulic or pneumatic squeezer or mechanical press, using a hollow punch and solid anvil as shown in sketch (below, right).

***Center-cutting end mills for hole preparation are available from Penn Engineering & Manufacturing Corp. See back page.**



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PERFORMANCE DATA

(All Values Are in Pounds)

Thread Code	TYPE CSOS STANDOFFS in 5052-H34 aluminum		TYPE CFHA STUDS in 5052-H-34 aluminum		TYPE CFHC STUDS in 5052-H-34 aluminum	
	Installation Force	Pull-out Resistance	Installation Force	Pull-out Resistance	Installation Force	Pull-out Resistance
440	2,900	220	1,500	190	1,500	200
632	3,200	240	2,500	220	2,500	260
832	4,000	300	3,000	240	3,000	310
032	5,000	400	3,500	300	3,500	360
0420	5,500	660	4,500	390	4,500	400

	TYPE CFHC STUDS in cold-rolled steel		TYPE CHC STUDS in 5052-H34 aluminum		TYPE CHC STUDS in cold-rolled steel	
	Installation Force	Pull-out Resistance	Installation Force	Pull-out Resistance	Installation Force	Pull-out Resistance
440	2,000	240	1,400	130	1,800	240
632	2,700	350	1,800	160	2,500	260
832	3,300	440	2,800	180	4,000	270
032	4,000	680	4,000	210	5,000	290
0420	5,500	700	Not available in this thread size			

Thread Code	TYPE CSS STANDOFFS in 5052-H34 aluminum		TYPE CSS STANDOFFS in cold-rolled steel	
	Installation Force	Pull-out Resistance	Installation Force	Pull-out Resistance
440	2,800	200	4,000	300
632	3,000	240	4,500	350
832	4,000	270	4,800	400
032	5,000	290	5,500	450
0420	Not available in this thread size			

PEM®

For your convenience, Double-ended, 2 Flute H.S.S. Center-cutting end mills are stocked at our factory.

Thread Size	Fastener Type	Required Size End Mill	PEM Part No.
4-40	CFHC, CFHA, CHC, CHA Studs	.172"	CHM-172
4-40	CSS, CSOS Standoffs	.213"	CHM-213
6-32	CFHC, CFHA, CHC, CHA Studs	.213"	CHM-213
6-32	CSS, CSOS Standoffs	.290"	CHM-290
8-32	CFHC, CFHA, CHC, CHA Studs	.290"	CHM-290
8-32	CSS, CSOS Standoffs	.312"	CHM-312
10-24 10-32	CFHC, CFHA, CHC, CHA Studs	.312"	CHM-312
10-24 10-32	CSS, CSOS Standoffs	.344"	CHM-344
¼-20	CFHC, CFHA Studs	.344"	CHM-344
¼-20	CSOS Standoffs	.390"	CHM-390

PENN ENGINEERING & MANUFACTURING CORP.

DOYLESTOWN, PA. 18901 U.S.A./TELEPHONE: 215-766-8853/TWX: 510-665-9338

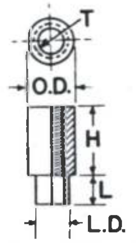
Printed in U.S.A.

STANDARDIZED BUSHINGS - SPACERS - STANDOFFS

MATERIAL: ALL HARDWARE ON THIS PAGE IS MADE OF: BRASS MIL SPEC. QQ-B-626A COMP. 22 - ½ HARD

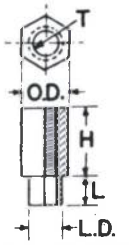
SWAGE TYPE THREADED STANDOFFS

ROUND



Nickel Plate Mil-F-14072 QQ-N-290
Type VII

HEX

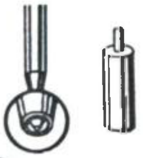


Cadmium plate per QQ-P-416
Type 2 Class B & clear chromate.

ROUND Nickel Plated Cat. No.	H Height Above Panel	L	For Panel Thickness	LD	OD	T Thread	HEX Cadmium Plated Cat. No.
1589-2	1/8	.109	1/16	.125	5/32	2-56	—
1589-3	1/8	.140	3/32	.125	5/32	2-56	—
1590-2	3/16	.109	1/16	.125	5/32	2-56	—
1590-3	3/16	.140	3/32	.125	5/32	2-56	—
1591-2	1/4	.109	1/16	.125	5/32	2-56	—
1591-3	1/4	.140	3/32	.125	5/32	2-56	—
1596-2	3/8	.109	1/16	.125	5/32	2-56	—
1596-3	3/8	.140	3/32	.125	5/32	2-56	—
1560 A	1/8	.109	1/16	.187	1/4	4-40	1653-2
1560-E	1/8	.140	3/32	.187	1/4	4-40	1653-3
1650-2	1/4	.109	1/16	.187	1/4	4-40	1627-2
1650-3	1/4	.140	3/32	.187	1/4	4-40	1627-3
1651-2	3/8	.109	1/16	.187	1/4	4-40	1628-2
1651-3	3/8	.140	3/32	.187	1/4	4-40	1628-3
1623-2	1/2	.109	1/16	.187	1/4	4-40	1629-2
1623-3	1/2	.140	3/32	.187	1/4	4-40	1629-3
1624-2	5/8	.109	1/16	.187	1/4	4-40	1654-2
1624-3	5/8	.140	3/32	.187	1/4	4-40	1654-3
1625-2	3/4	.109	1/16	.187	1/4	4-40	1655-2
1625-3	3/4	.140	3/32	.187	1/4	4-40	1655-3
1652-2	1	.109	1/16	.187	1/4	4-40	1630-2
1652-3	1	.140	3/32	.187	1/4	4-40	1630-3
1560 B	1/8	.109	1/16	.187	1/4	6-32	1620-2
1560 C	1/8	.140	3/32	.187	1/4	6-32	1620-3
1560 D	1/8	.171	1/8	.187	1/4	6-32	1620-4
1612-2	3/16	.109	1/16	.187	1/4	6-32	—
1612-3	3/16	.140	3/32	.187	1/4	6-32	—
1612-4	3/16	.171	1/8	.187	1/4	6-32	—
1546	1/4	.109	1/16	.187	1/4	6-32	1621-2
1546 B	1/4	.140	3/32	.187	1/4	6-32	1621-3
1546 D	1/4	.171	1/8	.187	1/4	6-32	1621-4
1561 B	3/8	.109	1/16	.187	1/4	6-32	1622-2
1561 C	3/8	.140	3/32	.187	1/4	6-32	1622-3
1561 D	3/8	.171	1/8	.187	1/4	6-32	1622-4
1604-2	1/2	.109	1/16	.187	1/4	6-32	—
1604-3	1/2	.140	3/32	.187	1/4	6-32	—
1604-4	1/2	.171	1/8	.187	1/4	6-32	—
1605-2	5/8	.109	1/16	.187	1/4	6-32	—
1605-3	5/8	.140	3/32	.187	1/4	6-32	—
1605-4	5/8	.171	1/8	.187	1/4	6-32	—
1608-2	3/4	.109	1/16	.187	1/4	6-32	—
1608-3	3/4	.140	3/32	.187	1/4	6-32	—
1608-4	3/4	.171	1/8	.187	1/4	6-32	—
1609-2	1	.109	1/16	.187	1/4	6-32	—
1609-3	1	.140	3/32	.187	1/4	6-32	—
1609-4	1	.171	1/8	.187	1/4	6-32	—

STAKING TOOLS FOR ABOVE STAND-OFFS

Precision made tools—heat treated and plated. Will give your job the professional appearance. Set of tools consist of: Top Staking Tool and Anvil.

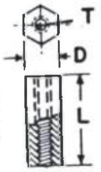


CAT. NO.	
TL-19	For Bushing 5/32 OD with 2-56 Thd.
TL-20	For Bushing 1/4 OD with 4-40 Thd.
TL-21	For Bushing 1/4 OD with 6-32 Thd.

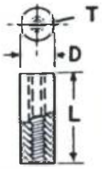
THREADED SPACERS

Threaded spacers ¼" O.D. threaded 4-40, 6-32, 8-32 available either in round or hex. Round type is nickel plated, hex type is cadmium.

HEX



Cadmium plate per QQ-P-416
Type 2 Class B & clear chromate.



ROUND

Nickel Plate Mil-F-14072 QQ-N-290
Type VII

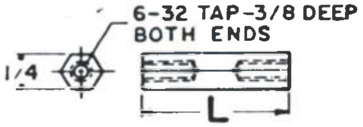
HEX Cadmium Plated Cat. No.	D	L	T Thread	ROUND Nickel Plated Cat. No.
1450	3/16	1/4	4-40	1547
1656	3/16	1/2	4-40	1657
1656A	3/16	3/4	4-40	1657A
1656B	3/16	1	4-40	1657B
1450A	1/4	1/4	4-40	1547A
1450B	1/4	3/8	4-40	1547B
1450C	1/4	1/2	4-40	1547C
1450D	1/4	3/4	4-40	1547D
1450E	1/4	1	4-40	1547E
1451A	1/4	1/4	6-32	1548A
1451B	1/4	3/8	6-32	1548B
1451C	1/4	1/2	6-32	1548C
1451D	1/4	5/8	6-32	1548D
1451E	1/4	3/4	6-32	1548E
1635	1/4	1	6-32	1548F
1474A	1/4	1/4	8-32	1692A
1474B	1/4	3/8	8-32	1692B
1474C	1/4	1/2	8-32	1692C
1474D	1/4	3/4	8-32	1692D
1474E	1/4	1	8-32	1692E
1452A	3/8	3/8	8-32	1549A
1452B	3/8	1/2	8-32	1549B
1452C	3/8	5/8	8-32	1549C
1452D	3/8	3/4	8-32	1549D
1452E	3/8	1	8-32	1549E

HEX SPACERS 6-32 TAPPED BOTH ENDS

Extra long length spacers ideal as standoff legs for Keystone pre-punched boards or your special application.

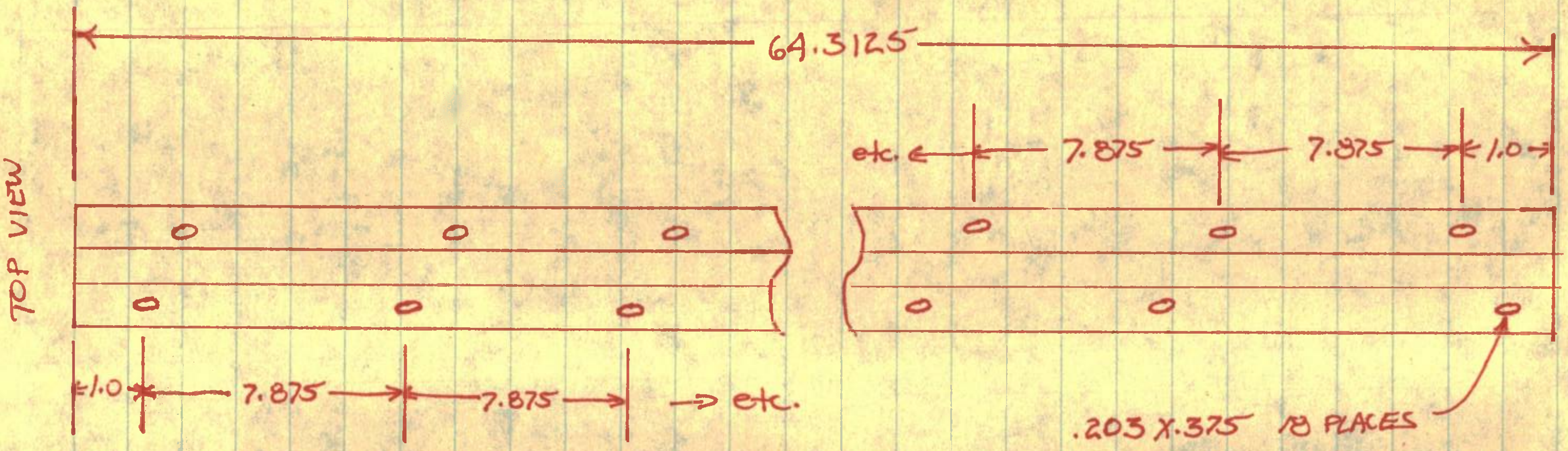
Brass cad. plated and chromate.

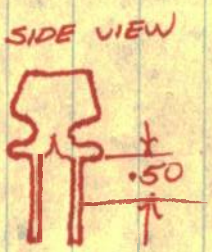
Cadmium plate per QQ-P-416 Type 2 Class B & clear chromate.



CAT. NO.	Length
1635	1
1636	1¼
1637	1½
1638	1¾
1639	2
1642	2¼
1643	2½

Contact us regarding your special screw machine parts. Our facilities and secondary operation department offer you prompt delivery to meet your requirements. Prompt quotations rendered upon receipt of your print, samples or description.





Notes

1) McMaster PN 1381A21

2) CUT TO LENGTH AND ADD
SLOTS

CONTROL PANEL HINGE
CI 00361

Targets

Bishop targets are specially designed to simplify and improve technical communication between all stages and segments of printed circuit board production. The correct choice of targets:

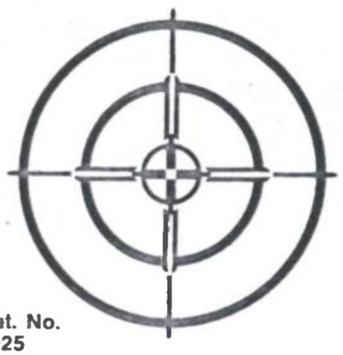
- *Increases PC board accuracy*
- *Improves continuity of communication between departments involved in the manufacture of PC boards*
- *Saves valuable time*

Bishop offers the widest selection of target symbols, conveniently divided into functional groups. Note the individual use listed under each target to help you select the symbol that best suits your particular need.

AVAILABLE IN OPAQUE BLACK ONLY • ALL ILLUSTRATIONS ARE SHOWN ACTUAL SIZE

UNIVERSAL TARGET

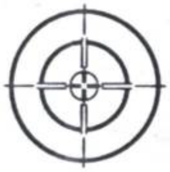
© 1968 Bishop Graphics, Inc



Cat. No. 4025

QTY: 100 SYMBOLS PER PKG.

Price: $12.80 Per Package

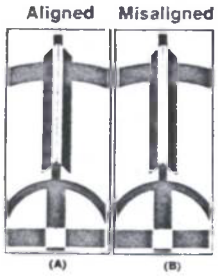


Cat. No. 4038

QTY: 250 SYMBOLS PER PKG.

Price: $10.00 Per Package

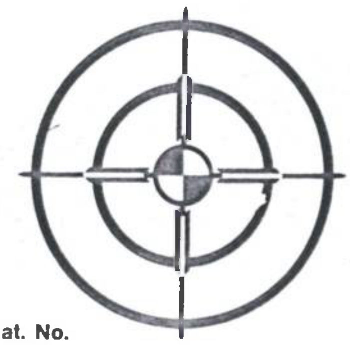
Solves common PC production problem of one target to meet needs of design engineer, photographer and PC draftsman. Features open center to allow photographer to locate tool master hairlines and photo reduction lines. V configurations on all four arms permit target alignment to grid line within a tolerance of ± .001″ (0,025 mm). See illustration below.



Full view of Bishop's Universal Target Grid can be seen through aperture.

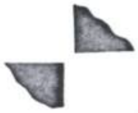
PHOTOGRAPHERS TARGET

© 1968 Bishop Graphics, Inc

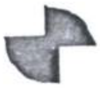


Cat. No. 4028

Incorporates features of Universal Target, except for quadrant blocks in center instead of open square. Quadrant blocks provide a fast, easy visual analysis to detect possible errors in photo exposure or development.



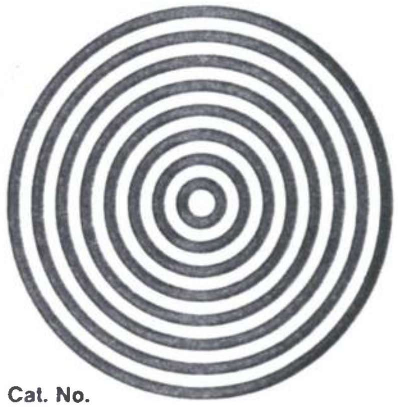
Points are not touching, indicating underexposure or underdevelopment.



Points are filled in, indicating overexposure or overdevelopment.

QTY: 100 SYMBOLS PER PKG.
Price: $12.80 Per Package

MOIRE PATTERN TARGET



Cat. No. 4019

For use mostly in multilayer alignment, this target creates a moire pattern to indicate the slightest deviation in any direction. It is extremely sensitive to layer misalignment and will indicate out-of-flat surfaces as well as off-register. Use of this pattern as a registration mark or photo reduction point is not recommended.

QTY: 100 SYMBOLS PER PKG.

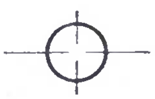
Price: $12.80 Per Package

CROSSHAIRS WITH OPEN CENTER

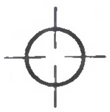
The open center provides accurate alignment to grid intersections at the artwork stage and during photography.

QTY: 250 SYMBOLS PER PKG.

Price: $9.05 Per Package



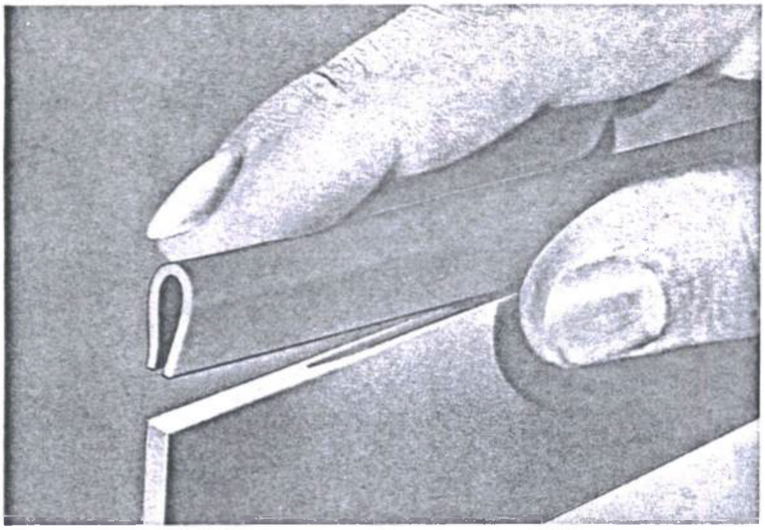
Cat. No. 4005

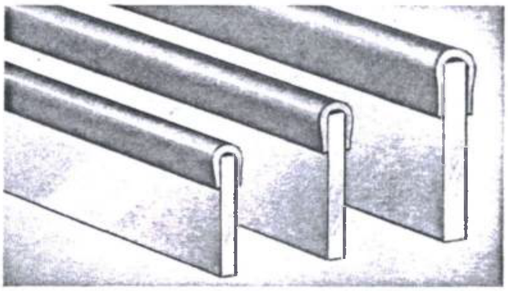


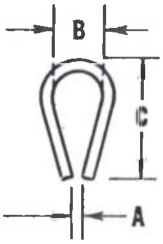
Cat. No. 4008

HOW TO ORDER: Specify number of packages and catalog number

DURO STRIPS



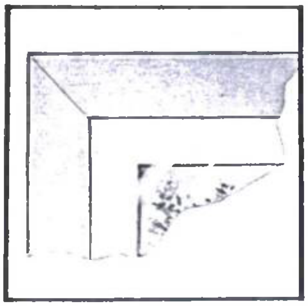


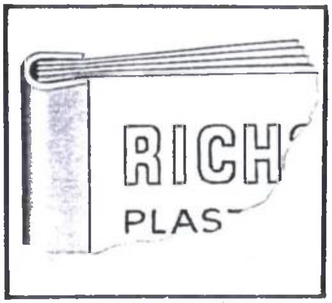


STYLE	A	B	C	Wall Thick.
DSC 1	.020 max.	1/8″	3/8″	3/64″
DSC 2	.031 max.	3/16″	1/2″	3/64″
DSC 3	.045 max.	1/4″	5/8″	1/16″

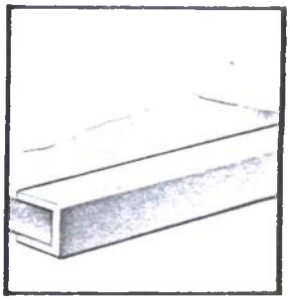
A conveyor or wear strip made of nylon with a built-in lubricant for superior wear resistance and lower friction. Non-abrasive, high heat resistant and resists ordinary solvents, mild acids and alkalis, rust and fungus growth. Reduces conveyor noise level.

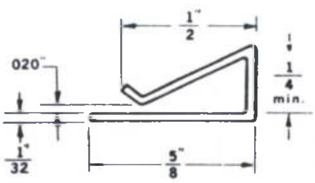
PLASTIC CHANNELS



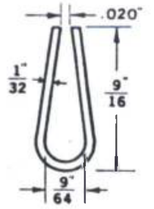


Stocked in white, high-impact styrene. Made in eight foot lengths, but may be cut in any length or at 45° angle when required. Special colors and shapes can be produced.

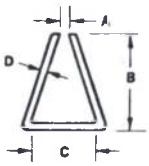




CAT. NO. CH20-250



CAT. NO. CH20-141

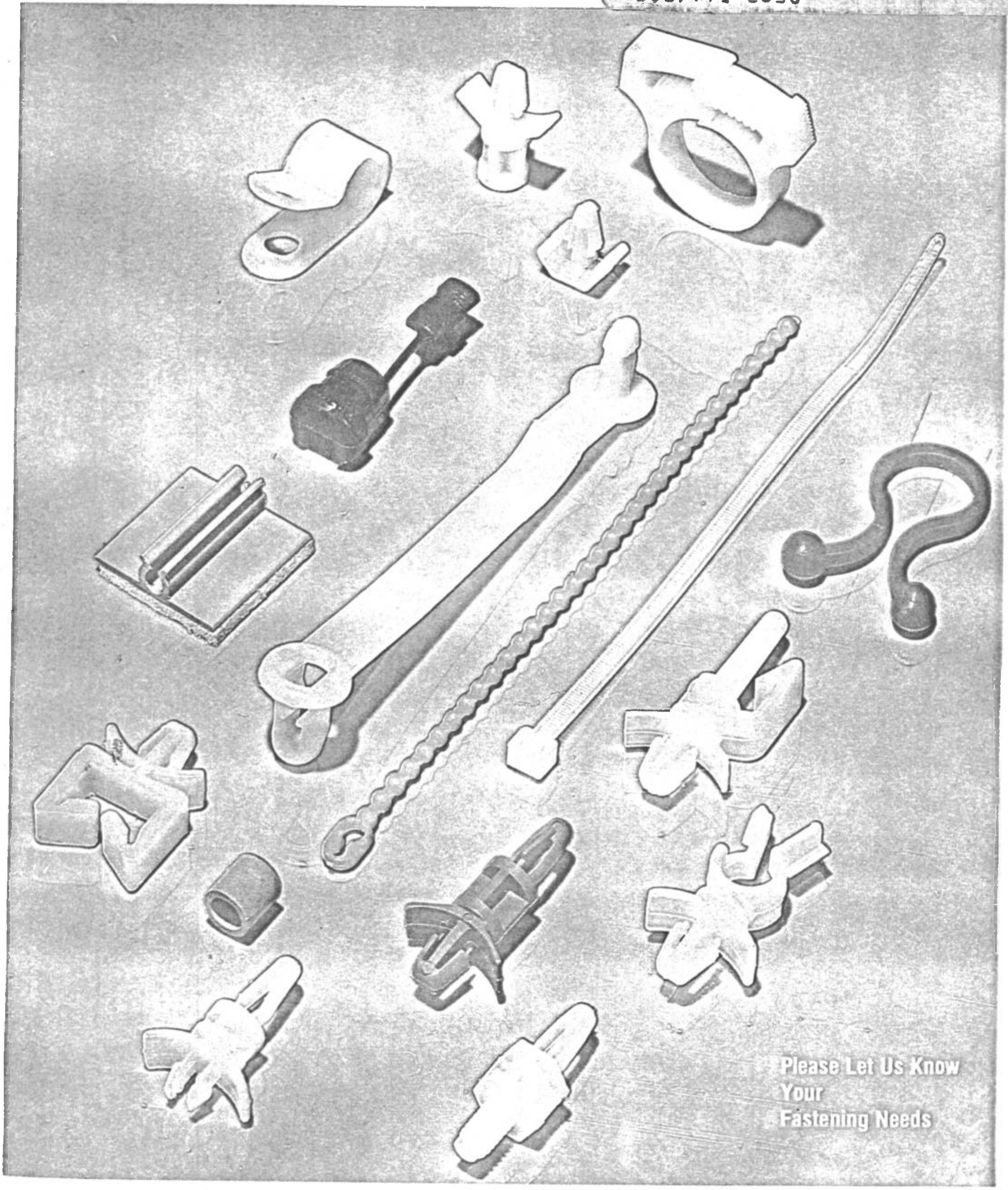


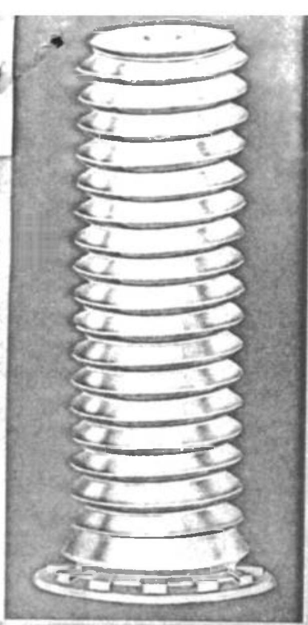
CAT. NO.	A	B	C	D
CH100-125	.100″	5/16″	1/8″ Min.	1/32″
CH200-250	.200″	3/8″	1/4″ Min.	1/32″
CH-15x50	.015″	7/16″	.050″ Min.	1/32″
CH300-375	.300″	1/2″	3/8″ Min.	3/64″
CH400-500	.400″	5/8″	1/2″ Min.	3/64″

The above shapes and sizes are stocked in white, high impact styrene. Special colors can be produced when required as well as special shapes. Send us your sketches and requirements for quotation.

RICHCO
PLASTIC COMPANY

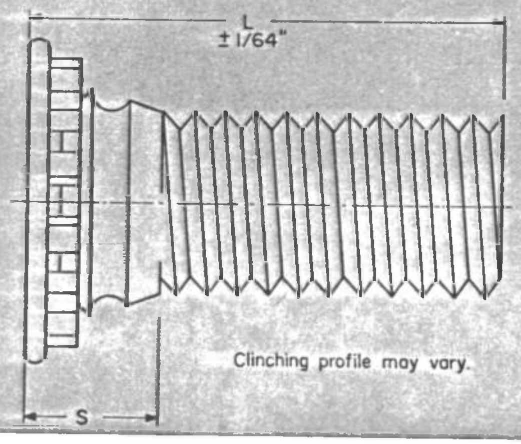
INDUSTRIAL ELECTRONICS INC.
8755 EAST ORCHARD ROAD
SUITE # 605
ENGLEWOOD, CO. 80111
303/771-2636

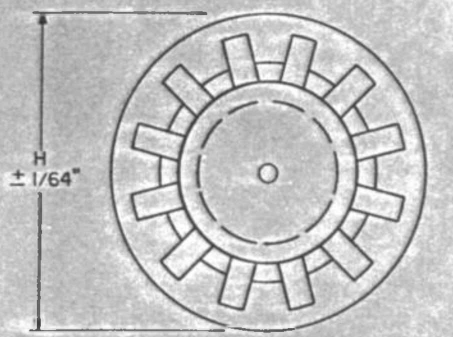




PEM SELF-CLINCHING FLUSH-HEAD STUD

for sheet thicknesses of 0.040" and greater





PART NUMBERS

Thread Size	Flush-head			Thin-head		Dash Numbers Denoting Length "L" (in 16ths of an inch) (See Note "L" Below)										
	Steel	Stainless Steel	Aluminum	Steel	Stainless Steel	¼	5/16	⅜	½	⅝	¾	⅞	1	1¼	1½	
.086-56 (#2-56)	FH-256-	FHS-256-	Not Available	TFH-256-*	TFHS-256-*	-4*	-5*	-6*	-8*	-10*		N/A	N/A	N/A	N/A	
.112-40 (#4-40)	FH-440-	FHS-440-	FHA-440-	TFH-440-	TFHS-440-	-4	-5	-6	-8	-10	-12		N/A	N/A	N/A	
.138-32 (#6-32)	FH-632-	FHS-632-	FHA-632-	TFH-632-	TFHS-632-	-4	-5	-6	-8	-10	-12	-14	-16	-20		
.164-32 (#8-32)	FH-832-	FHS-832-	FHA-832-	TFH-832-	TFHS-832-	-4	-5	-6	-8	-10	-12*	-14*	-16*	-20*	-24*	
.190-24 (#10-24)	FH-024-	FHS-024-	FHA-024-	TFH-024-*	TFHS-024-*			-6*	-8*	-10*	-12*	-14*	-16*	-20*	-24*	
.190-32 (#10-32)	FH-032-	FHS-032-	FHA-032-	TFH-032-*	TFHS-032-*			-6*	-8*	-10*	-12*	-14*	-16*	-20*	-24*	
.250-20 (¼-20)	FH-0420-	FHS-0420-	FHA-0420-	Not Available	Not Available				-8	-10	-12	-14	-16	-20	-24	See HFH
.313-18 (5/16-18)	FH-0518-	FHS-0518-	Not Available	Not Available	Not Available					-10	-12	-14	-16	-20	-24	

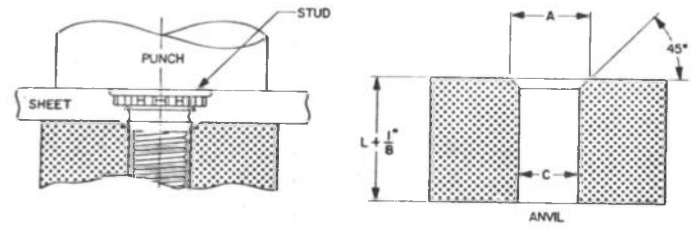
* Types TFH and TFHS self-clinching thin-head studs are not normally stocked in these sizes but are available on special order in mininum quantities of 5,000.

FLUSH-HEAD STUD INSTALLATION SUGGESTIONS

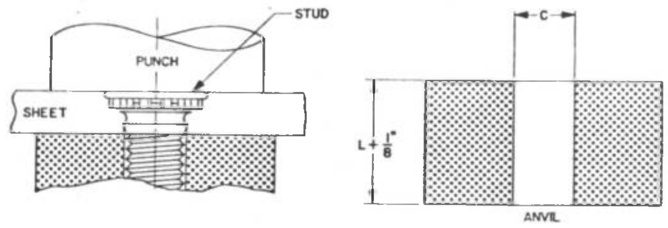
Apply squeezing force on punch sufficient only to embed head of stud flush with sheet. Avoid excessive forces.

The two sketches below indicate suggested tooling for applying these forces. Note that for sheet .060" and thicker, the anvil requires only a straight through hole to accommodate stud. For sheet .059" and less, this hole requires countersink with dimension A at top to provide for metal flow around shank of stud.

The PEM-serter - automatic press designed especially to provide proper parallel squeezing action for best installation of PEM self-clinching fasteners can be tooled for automatic feeding and installation of PEM studs as well. Complete specifications on the PEM-serter are available from your PEM fastener representative or the factory in Doylestown, Pa.



Tooling for panel thicknesses .059" and less with #2 thru #10 thread sizes and less than .093" for ¼-inch threads.



Tooling for panel thicknesses .060" and greater with #2 thru #10 thread sizes and .093" and greater for ¼ and 5/16-inch threads.

Copyright 1968, 1972, 1973, 1975, and 1977 Penn Engineering & Manufacturing Corp.

ENGINEERING DATA

MATERIAL: TYPE FH, TYPE TFH—Carbon Steel
TYPE FHS, TYPE TFHS—300 Series Stainless Steel
TYPE FHA—2024-T4 Aluminum
Thread sizes #2-56 and #5/16-18 are not available in aluminum, and not all of the other sizes are normally stocked in aluminum.

FINISHES: TYPE FHS, TYPE TFHS—Passivated per QQ-P-35B
TYPE FHA—None
TYPE FH, TYPE TFH—Finish Nomenclature:

Suffix:		Finish:
CI	Standard	Cadmium. Spec. QQ-P-416C, Type 1, Class 3 plus clear chromate passivation
C	Optional	Cadmium Chromate. Spec. QQ-P-416C, Type II, Class 3
ZI	Optional	Zinc. Spec. QQ-Z-325B, Type I, Class 3 plus clear chromate passivation
ZC	Optional	Zinc Chromate. Spec. QQ-Z-325B, Type II, Class 3
X	Optional	No Finish

THREADS: Class 2A (MIL-S-7742B)

FOR USE IN: TYPE FH, TYPE TFH—Materials with Rockwell hardness of B80 or less.

TYPE FHS, TYPE TFHS—Materials with Rockwell hardness of B70 or less.

TYPE FHA—Materials with Rockwell hardness of B50 or less.

Before using in magnesium, consult our engineering department.

PART NUMBER DESIGNATION: Consists of Type Letters, Dash No. indicating thread size, Dash No. indicating length (in 1/16ths of an inch) and finish suffix.

EXAMPLES: FH-832-6CI. Carbon steel, flush-head captive stud with #8-32 thread, 3/8" long with standard cadmium plated finish plus clear chromate passivation. TFHS-832-10. Stainless steel, thin head captive stud with #8-32 thread, 5/8" long.

PEM®

Captive Threads for Production Fastening
with Stay-in-place Convenience

SELF-CLINCHING FASTENERS
- Original PEM Fasteners
- Standard, Miniature or Floating Captive Fasteners
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- Panel Fastener Assemblies
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- Standoffs

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- PEM Self-locating Weld Fasteners

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PEM-SERTER® AUTOMATED PRESS
- Available to install PEM fasteners quickly and accurately using fast, parallel squeezing action.

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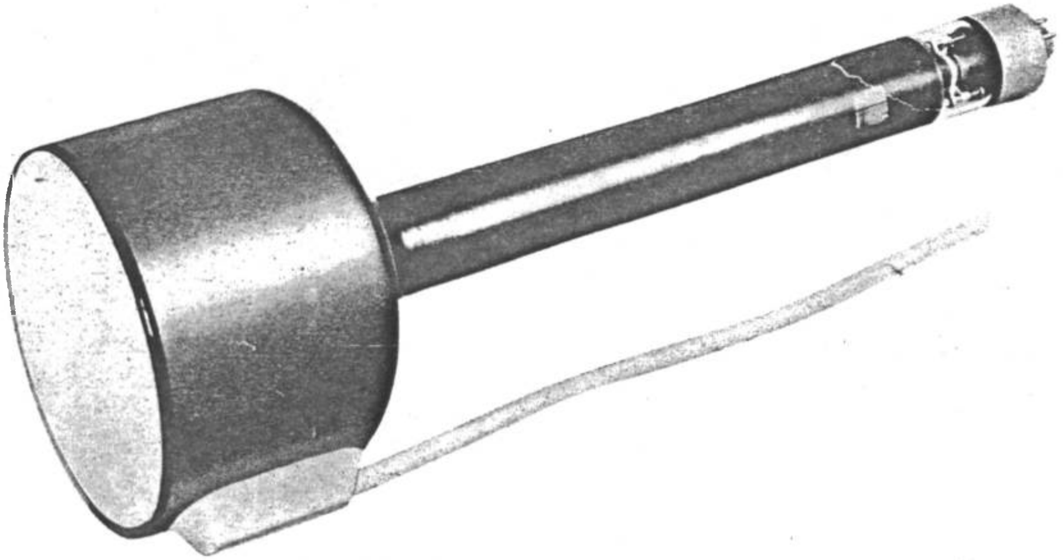
Printed in U.S.A.

FAIRCHILD

DUMONT INDUSTRIAL CATHODE-RAY TUBES

TYPE: 5CKP1, 5CKP16

24



GENERAL CHARACTERISTICS

ELECTRICAL DATA

Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angle (Approx.)	42 Degrees
Direct Interelectrode Capacitances, Approx. Values	
Cathode to all other electrodes	2.0 μμf
Grid #1 to all other electrode	9.0 μμf

OPTICAL DATA

Phosphor Number	1	16
Fluorescence	Green	Violet
Persistence	Medium	Extremely Short
Faceplate	Clear, non-browning	

MECHANICAL DATA

Overall Length	16⅝ ± ⅜ Inches
Greatest Diameter of Bulb	5¼ ± 3/32 Inches
Minimum useful screen diameter	4¼ Inches
Neck Length	12⅛ Inches
Bulb Contact	Special Molded Contact
Bulb Contact Alignment: Centerline of molded contact aligns with Vacant Pin Position #3	± 10 Degrees
Base	B7-51
Basing	12 AM
Weight (Approx.)	2 Pounds

MAXIMUM RATINGS (Design Center Values)

Heater Voltage	6.3 Volts
Heater Current at 6.3 Volts	0.6 ± 10% Ampere
Accelerator Voltage	20,000 Max. Volts DC
Grid No. 2 Voltage	1,250 Max. Volts DC
Grid No. 1 Voltage	
Negative Bias Value	200 Max. Volts DC
Positive Bias Value	—2 Max. Volts DC
Positive Peak Value	0 Max. Volts
Peak Heater to Cathode Voltage	
Heater negative with respect to cathode	180 Max. Volts
Heater positive with respect to cathode	180 Max. Volts

TYPICAL OPERATING CONDITIONS

Accelerator Voltage	20,000 Volts DC
Grid No. 2 Voltage	1,000 Volts DC
Grid No. 1 Voltage[1]	—35 to —110 Volts DC
Line Width "A"[2]	.001 Inch Max.
Focusing Coil Current[3]	135 Approx. Ma. DC
Spot Position[4]	Within a 15 mm. Radius Circle

MAXIMUM CIRCUIT VALUES

Grid #1 Circuit Resistance	1.5 Max. Megohms

NOTES

1. Visual extinction of the undeflected, focused spot.
2. For an accelerator current of 25μ ADC. Line width is measured with a 525-line interlaced pattern, the pattern width adjusted to 90% of minimum useful screen diameter. Line width is the merged focused raster height divided by the number of lines (525) measured in the tube face center.
3. Using JETEC #106 Focus coil, with Grid No. 1 bias voltage adjusted to produce an accelerator current of 25 microamperes and with the distance from reference line to center of air gap equal to 3½ inches.
4. The center of the undeflected, unfocused spot will fall within a 15 mm. radius circle concentric with the tube face center, with the tube shielded.
5. If this tube is operated at voltages in excess of 16,000 volts, X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range. Such protection may be provided by the protective face viewing window of apparatus using tubes of this type. Protection will be adequate if the radiation measured in contact with the face viewing window is not in excess of 6.25 mr/hr.

FEATURES

- High Resolution with one mil Spot Size*
- Uses Conventional Focus Coil
- Uses Conventional Deflection Yoke
- Extremely Fine Screen With Minimum Voids
- Flat-Non-Browning Faceplate Ground and Polished
- Optical Quality Faceplate
- Molded Accelerator Lead For High Voltage and High Altitude Operation
- Light Weight

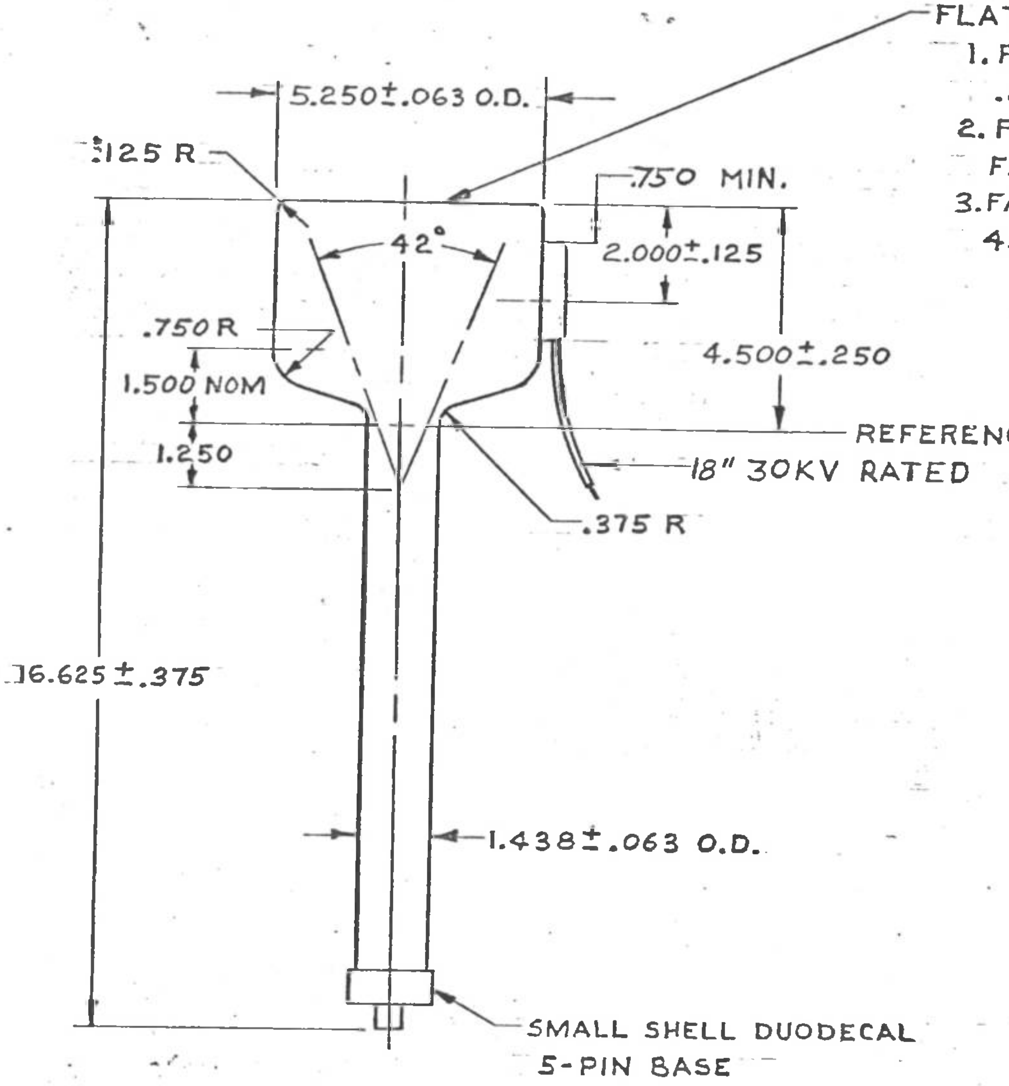
*Measured by Shrinking Raster Method

APPLICATIONS

- Flying Spot Scanner
- Precision Radar
- Photographic
- Intermediate Film Transmission Systems

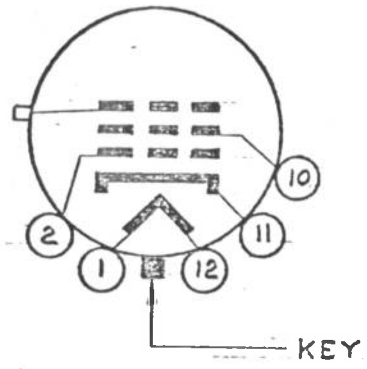
THOMAS
ELECTRONICS, INC.

5M168



FLAT FACE:
1. FACEPLATE THICKNESS .245±.005
2. PARALLELISM OF INDIVIDUAL FACEPLATES WITHIN .001
3. FATNESS DEVIATION OVER 4.250 DIA .006 MAX

BASING DIAGRAM



PIN NO	ELEMENT
1	HEATER
2	GRID NO 1
10	GRID NO 2
11	CATHODE
12	HEATER

NOTE:
1. THE POINT WHERE JEDEC G112 REFERENCE LINE GAUGE WILL STOP.
2. THE J1-21 CAP ALIGNS WITH VACANT PIN NO 3 AND ON THE SAME SIDE.

021171

chassis Trak®

IEW MAILING ADDRESS:
P.O. BOX 39100
INDIANAPOLIS, IN 46239

CHASSIS-TRAK

A DIVISION OF GENERAL DEVICES CO., INC.
525 SO. WEBSTER AVENUE
INDIANAPOLIS, INDIANA 46219

2763

897-7000
AREA CODE 317 PHONE ~~359-5407~~
TELEX NO. 27-2169

QUOTATION

DATE March 23, 1981

Your Local Representative Is: 16

COMPUTER IMAGE CORPORATION
2475 West Second Avenue, Suite 4
Denver, CO 80223
Attn.: Glen Hill, Engr.

JENSEN REPRESENTATIVES CO.
P. O. Box 203
Sedalia, CO 80135
(303) 688-4154

DEAR SIR:

THANK YOU FOR THE OPPORTUNITY OF QUOTING CHASSIS-TRAK PRODUCTS FOR YOUR APPLICATION. WE ARE PLEASED TO QUOTE THE FOLLOWING PRICES:

ITEM NUMBER	PART NUMBER AND DESCRIPTION	QUANTITY	PRICE
1	C-300-N-120 thru 124 MODIFIED!!	1 - 4 pr.	$42.84 pr.
		5 - 9 pr.	$40.08 pr.
	for less than 10 pairs, add set-up		$45.00
		10-49 pr.	$36.72 pr.

QUOTATION IS FIRM FOR 60 DAYS

DELIVERY: 7 weeks or sooner A.R.O.

Sincerely,
Harrison L. Crouch
Sales Manager
CHASSIS-TRAK DIV.
Harrison L. Crouch

TERMS: Net 30 Days upon approved credit.
F.O.B.: Indianapolis, Indiana

CTQ4/11-73

233-9423

COMPUTER IMAGE
CORPORATION

2475 W. SECOND AVENUE – SUITE 4
DENVER, COLORADO 80223
TELEPHONE (303) 934-5801

PURCHASE ORDER
P.O. 6233
SHOW THIS NUMBER ON ALL DOCUMENTS

☒ CONFIRMING
☐ NON–CONFIRMIN

VENDOR:
ACCURIDE
c/o Palmer Associates
2545 west 8th
Denver, Co 80204

Ken Palmer 629-0112

SHIP TO:
SAME

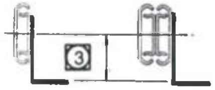
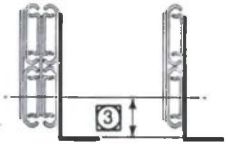
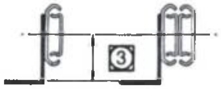
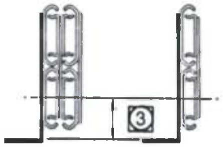
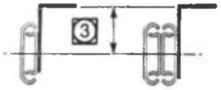
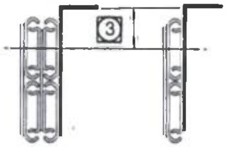
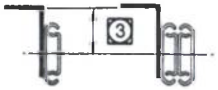
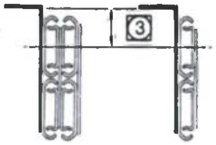
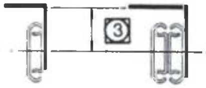
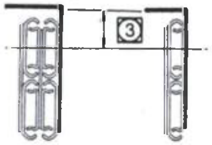
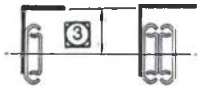
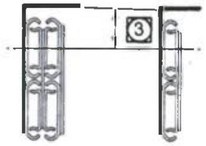
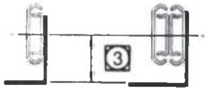
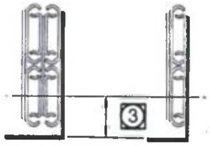
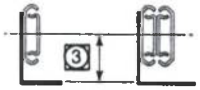
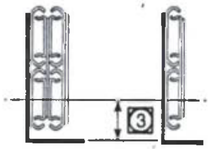
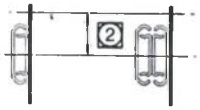
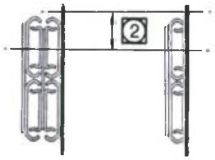
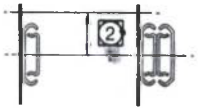
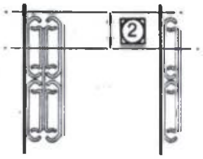
12-12-8

PURCHASE ORDER DATE 10/20/80	BUYER Joe S	TERMS ~~CHS~~ * *	RESALE YES ☐ NO ☒	SHIP VIA UPS	FOB CAL. SANTA FE SPRINGS	DATE REQUIRED 12/12/
REQUESTER Glenn Hill		DEPARTMENT Engineering	ACCOUNT CHARGED 020		COMPLETED	

ITEM	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	AMOUNT
* 1.	4pr		C305-24 with LR, Type AB Accumount, and Type SB shock Blocks C-305-24-AB20	80.00	320.0
2.	8	ea	C5403 four hole front bracket short	1.60	12.80
3.	8	ea	C5413 four hole rear bracket long	3.63	29.04
4.	~~4~~ 16	ea	hardware kits	.70	8.40 2.~~80~~
5.	1	EA	SETUP CHARGE FOR ITEM #1		100.0
			* * CASH IN ADVANCED		~~464.6~~
			CHECK # 23923		473.04

ITEM ONE				ITEM TWO				ITEM THREE			
VO.	INV.	DATE	AMT.	VO.	INV.	DATE	AMT.	VO.	INV.	DATE	AMT.

ACCOUNTS PAYABLE

cumount® Drawer (moving) Member				Accumount® Cabinet (stationary) Member			
for slide models: **200** and **300**	Order Code	for slide models: **500** and **600**	Order Code	for slide models: **200** and **300**	Order Code	for slide models: **500** and **600**	Order Code
	"AA"		"AF"		"AL"		"AR"
	"AB"		"AG"		"AM"		"AS"
	"AC"		"AH"		"AN"		"AT"
	"AD"		"AJ"		"AO"		"AU"
	"AE"		"AK"		"AP"		"AY"

Make Dwg of Front veiw of scanconverter drawers with Accuride slides to determine where mounting holes on rack rails are

NOTES: Unless otherwise specified.

1. Left hand slides shown, right hand slides opposite.

② This dimension to be 1.19 [30.2 mm] min.

③ This dimension to be 13/16 in [20.6mm] to 24/16 in [38.1mm] max.

4. When ordering, specify drawer member first, and then cabinet member.

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ORDERING EXAMPLE: C - 301 - 16 - AD 13 - AN 15

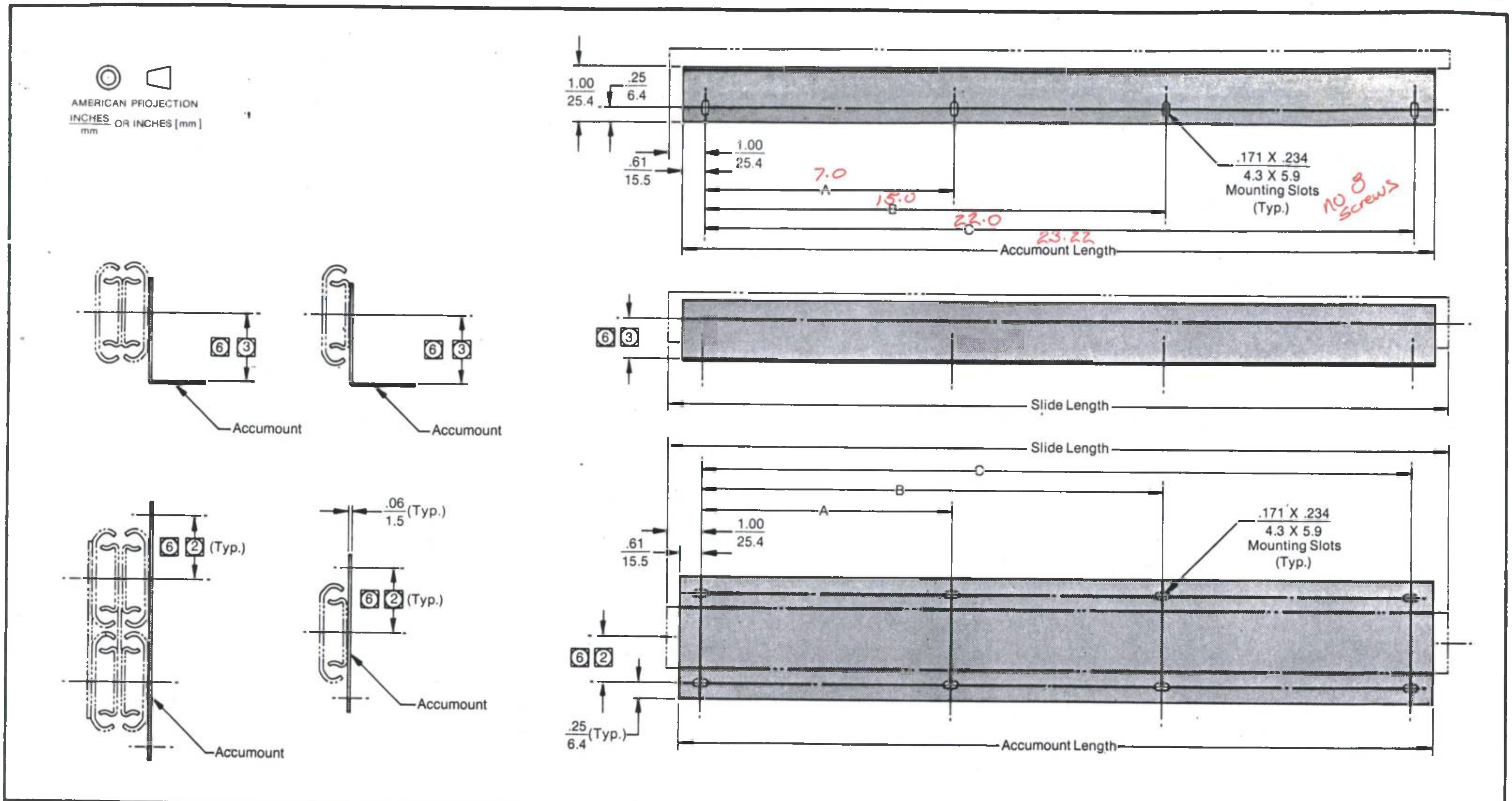
Slide Model No.
Slide Length
13 = 13/16"
15 = 15/16"

C-305-24-AB20

Accuride® products are covered by patents and patents pending. All drawings subject to internal change without prior notification.

Accuride®
DIVISION OF STANDARD PRECISION, INC.

Accumount®
ORDERING INFORMATION SELECTION CHART



SLIDE LENGTH	A	B	C	Accumount LENGTH	SLIDE LENGTH mm	A mm	B mm	C mm	Accumount LENGTH mm
12.00	4.000	6.000	10.000	11.22	305	101.6	152.4	254.0	286
13.00	4.000	7.000	11.000	12.22	330	101.6	177.8	279.4	311
14.00	4.000	8.000	12.000	13.22	356	101.6	203.2	304.8	336
15.00	4.000	9.000	13.000	14.22	381	101.6	228.6	330.2	361
16.00	4.000	10.000	14.000	15.22	406	101.6	254.0	355.6	387
17.00	4.000	11.000	15.000	16.22	432	101.6	279.4	381.0	412
18.00	4.000	12.000	16.000	17.22	457	101.6	304.8	406.4	437
19.00	7.000	10.000	17.000	18.22	483	177.8	254.0	431.8	463
20.00	7.000	11.000	18.000	19.22	508	177.8	279.4	457.2	488
21.00	7.000	12.000	19.000	20.22	533	177.8	304.8	482.6	514
22.00	7.000	13.000	20.000	21.22	559	177.8	330.2	508.0	538
23.00	7.000	14.000	21.000	22.22	584	177.8	356.6	533.4	564
24.00	7.000	15.000	22.000	23.22	610	177.8	381.0	558.8	590
25.00	7.000	16.000	23.000	24.22	635	177.8	406.4	584.2	615
26.00	7.000	17.000	24.000	25.22	660	177.8	431.8	609.6	641
27.00	7.000	18.000	25.000	26.22	686	177.8	457.2	635.0	665
28.00	7.000	19.000	26.000	27.22	711	177.8	482.6	660.4	691

⑥ This dimension to be specified by customer in .063 (1.6 mm) of an inch increment.

5. When ordering, specify drawer member first, and then cabinet member.

4. See ordering information page.

③ This dimension to be specified by customer .438 [11.1 mm] min. to 1.50 [38.2 mm] max.

② This dimension to be specified by customer .937 [23.8 mm] min.

1. Left hand slide shown, right hand slide opposite.

NOTES: Unless otherwise specified.

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Accumount®

TOLERANCES: unless otherwise specified

	in	mm		in	mm
.XXX	±.010	.25	Travel	±.12	3.1
.XX	±.030	.79	Holes	±.006	.15
			Angular	± 1°	

7.250
.893

7.875
.893

~~8.60~~

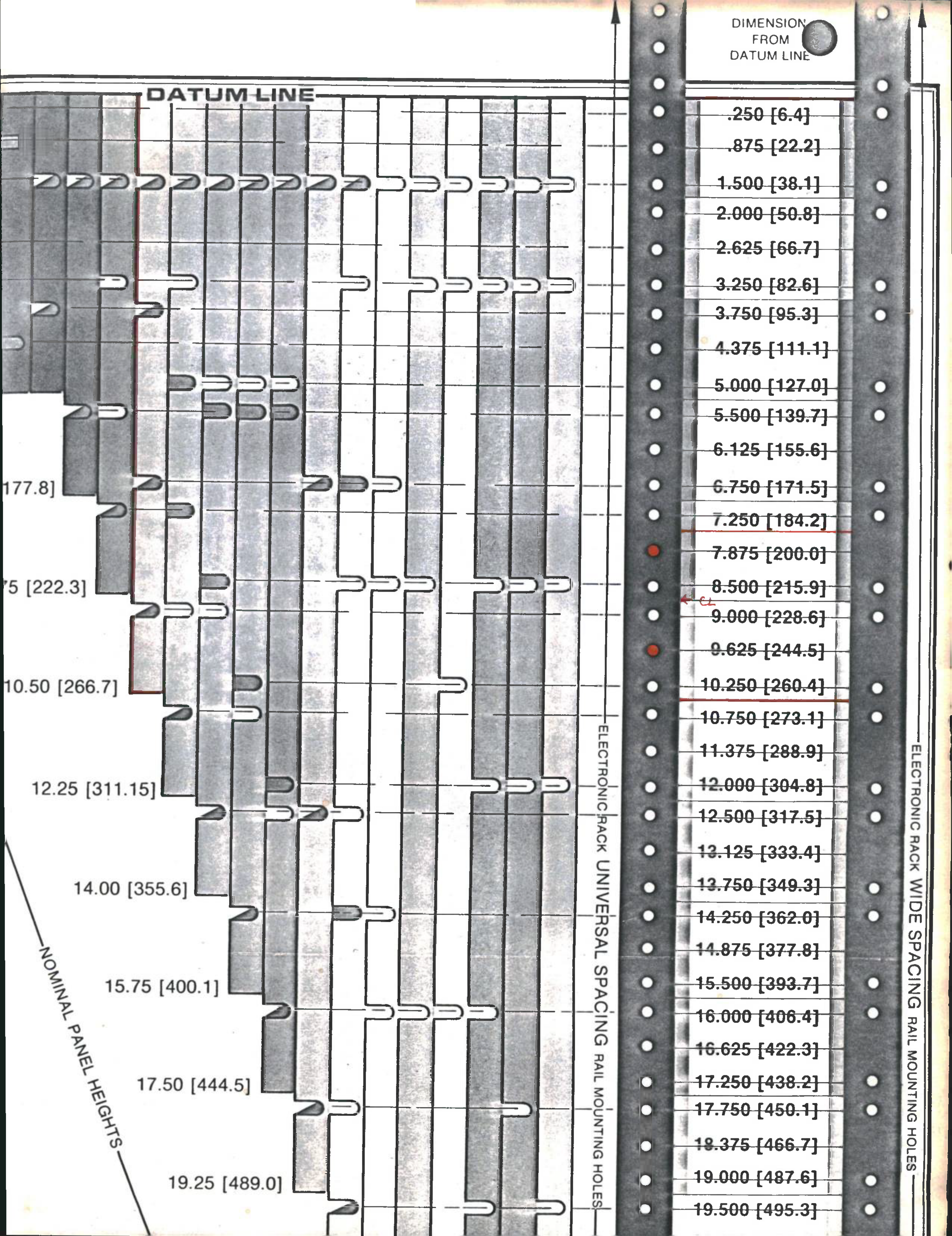
1.732

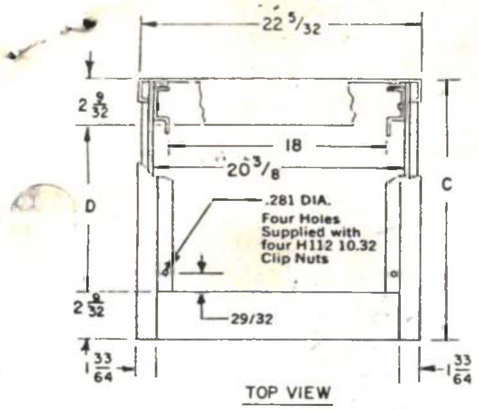
1.25

③ $\boxed{1.268}$

OR

$\boxed{.643}$


DIMENSION FROM DATUM LINE
DATUM LINE
.250 [6.4]
.875 [22.2]
1.500 [38.1]
2.000 [50.8]
2.625 [66.7]
3.250 [82.6]
3.750 [95.3]
4.375 [111.1]
5.000 [127.0]
5.500 [139.7]
6.125 [155.6]
6.750 [171.5]
7.250 [184.2]
7.875 [200.0]
8.500 [215.9]
CL
9.000 [228.6]
9.625 [244.5]
10.250 [260.4]
10.750 [273.1]
11.375 [288.9]
12.000 [304.8]
12.500 [317.5]
13.125 [333.4]
13.750 [349.3]
14.250 [362.0]
14.875 [377.8]
15.500 [393.7]
16.000 [406.4]
16.625 [422.3]
17.250 [438.2]
17.750 [450.1]
18.375 [466.7]
19.000 [487.6]
19.500 [495.3]
177.8]
5 [222.3]
10.50 [266.7]
12.25 [311.15]
14.00 [355.6]
15.75 [400.1]
17.50 [444.5]
19.25 [489.0]
NOMINAL PANEL HEIGHTS
ELECTRONIC RACK UNIVERSAL SPACING RAIL MOUNTING HOLES
ELECTRONIC RACK WIDE SPACING RAIL MOUNTING HOLES



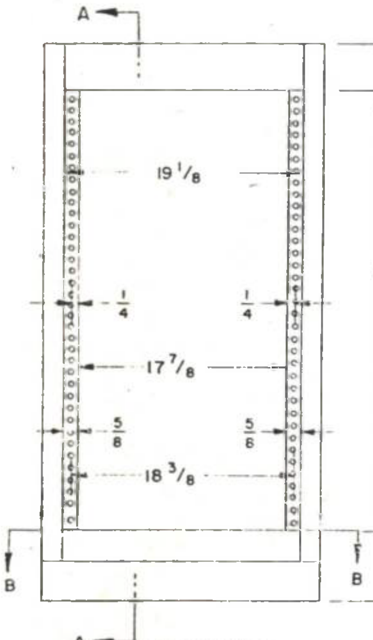
TOP VIEW

SQUARE CORNER

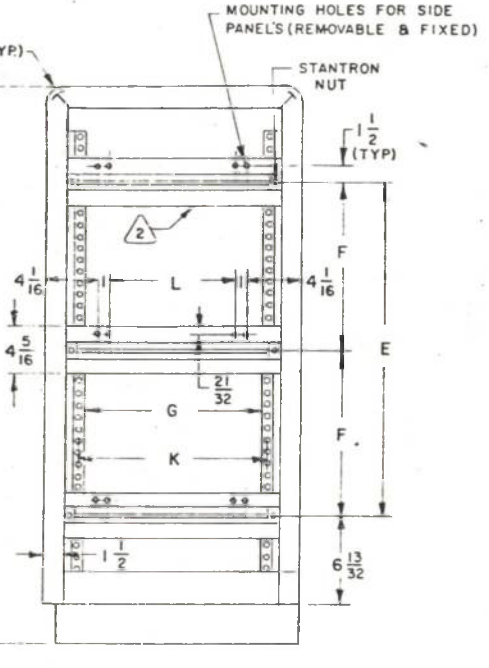
STANTRON®

BALL CORNER

VERTICAL CABINET
"200" SERIES
19" WIDE PANEL SPACE
DEPTH: 22 ⅛" or 25 ⅝" or 30 ⅞"

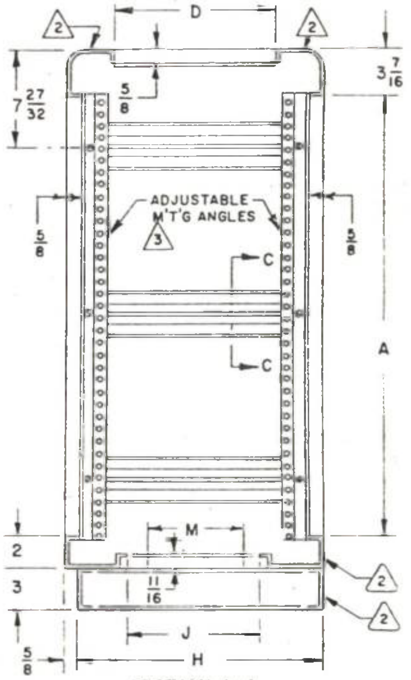


FRONT VIEW

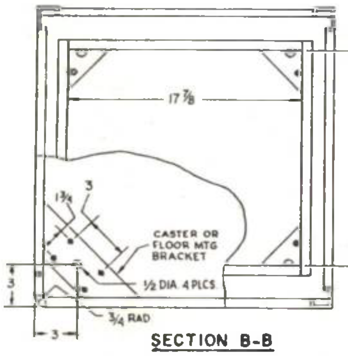


SIDE VIEW

17
1 1/2
15 1/2



SECTION A-A



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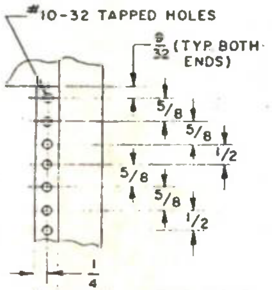
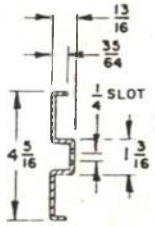


TYP. HOLE SPACING (W.E. & E.I.A.)



SECTION C-C

17 7/8
1 4/8
16 3/8
16 6/8
15 5/8

ORDERING CHART

CAT. NO.*	A	B	C	D	E	F	G	H	J	K	L	M
*200-35-22	35 1/16	43 1/2	22 1/8	17 9/16	26 1/4	13 1/8	14 5/8	21 1/2	16 5/16	15 1/8	12 7/8	15 3/4
*200-43-22	43 13/16	52 1/4	22 1/8	17 9/16	35	17 1/2	14 5/8	21 1/2	16 5/16	15 1/8	12 7/8	15 3/4
*200-52-22	52 9/16	61	22 1/8	17 9/16	43 3/4	21 7/8	14 5/8	21 1/2	16 5/16	15 1/8	12 7/8	15 3/4
*200-61-22	61 5/16	69 3/4	22 1/8	17 9/16	52 1/2	26 1/4	14 5/8	21 1/2	16 5/16	15 1/8	12 7/8	15 3/4
*200-70-22	70 1/16	78 1/2	22 1/8	17 9/16	61 1/4	30 5/8	14 5/8	21 1/2	16 5/16	15 1/8	12 7/8	15 3/4
*200-78-22	78 13/16	87 1/4	22 1/8	17 9/16	70	35	14 5/8	21 1/2	16 5/16	15 1/8	12 7/8	15 3/4
*200-35-25	35 1/16	43 1/2	25 5/8	21 1/16	26 1/4	13 1/8	18 1/8	25	19 13/16	18 5/8	15 1/2	19 1/4
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*200-70-25	70 1/16	78 1/2	25 5/8	21 1/16	61 1/4	30 5/8	18 1/8	25	19 13/16	18 5/8	15 1/2	19 1/4
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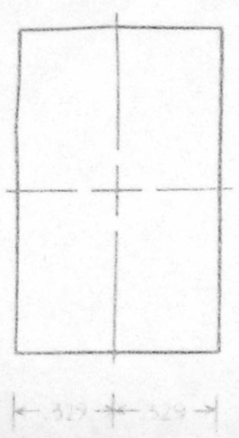
*200-70-30	70 1/16	78 1/2	30 7/8	26 5/16	61 1/4	30 5/8	23 3/8	30 1/4	25 1/16	23 7/8	20 3/4	24 1/2
*200-78-30	78 13/16	87 1/4	30 7/8	26 5/16	70	35	23 3/8	30 1/4	25 1/16	23 7/8	20 3/4	24 1/2

NOTE:

1. MATERIAL: △1 14 GA. C.R.S.
△2 16 GA. C.R.S.
△3 12 GA. C.R.S.

* PREFIX FOR SQUARE CORNER FRAME : "SF". EXAMPLE: SF 200-43-22
PREFIX FOR BALL CORNER FRAME : "F". EXAMPLE: F 200-43-22

SEE SECTION 4 FOR TRIM



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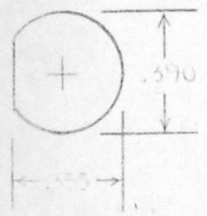

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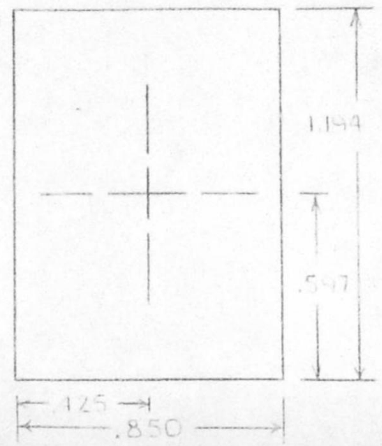

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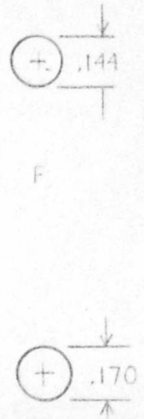

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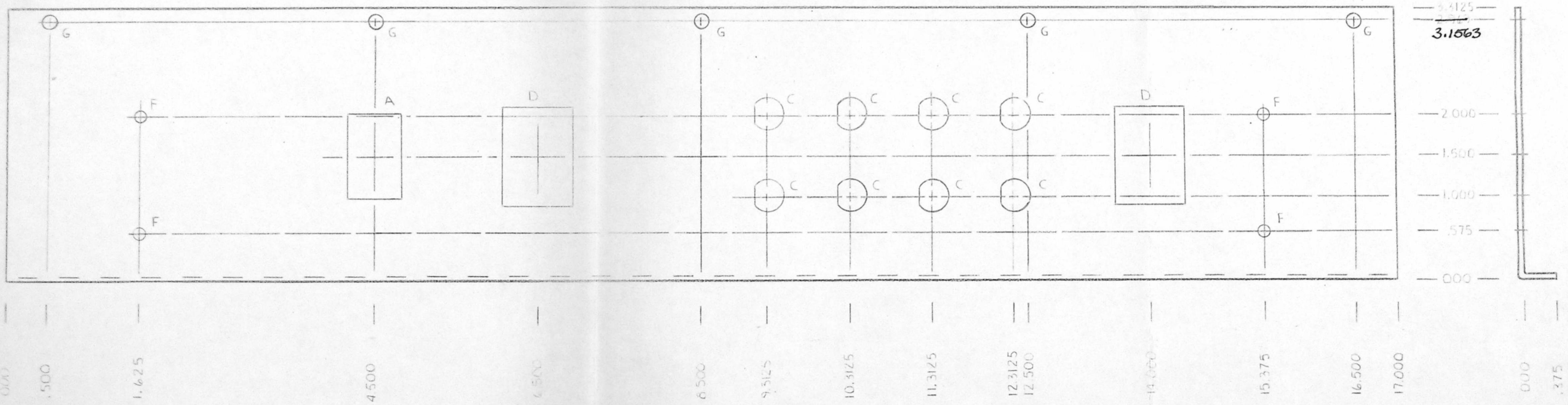


MATERIAL: 5052-H32 ALUMINUM, .063 THK
FINISH: CLEAR ANODIZE
SCALE: FULL DETAIL 2X

TOLERANCE		
FRACT	±	1/32
XX	±	.015
XXX	±	.005

COMPUTER
IMAGE
CORPORATION

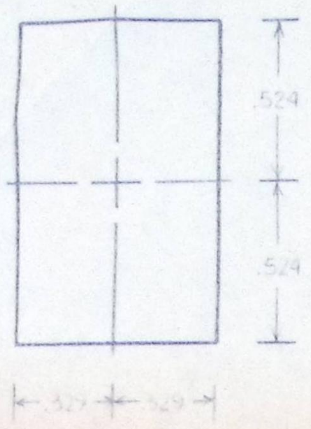
2475 W. 2nd AVE
DENVER, COLORADO 80223

SCALE
DATE 2-27-81
DR'N EVL CKD JSH
AP'VD

REVISIONS	BY	DATE

TITLE SC MONITOR DRAWER
REAR PANEL

NO CI-00312



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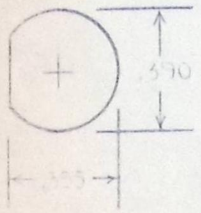

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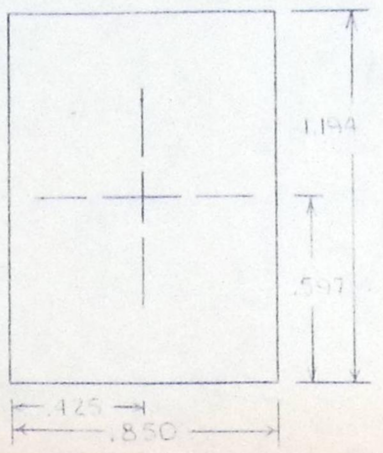

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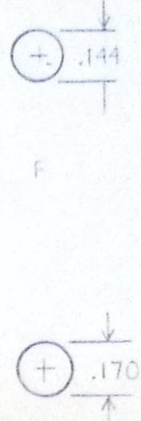

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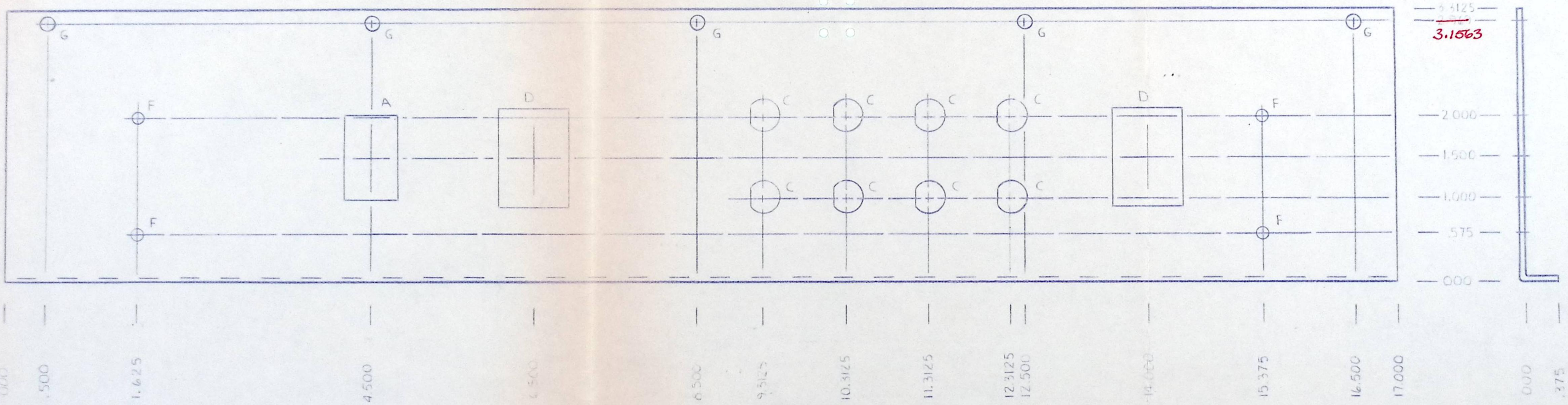


MATERIAL: 5052-H32 ALUMINUM, .063 THK
FINISH: CLEAR ANODIZE
SCALE: FULL DETAIL 2X

TOLERANCE		
FRACT	±	1/32
.XX	±	.015
.XXX	±	.005

COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE.
DENVER, COLORADO 80223

SCALE		REVISIONS	BY	DATE
DATE 2-27-81				
DR'N EVL	CKD JSH			
AP'VD				

TITLE SC MONITOR DRAWER
REAR PANEL

NO CI-00312

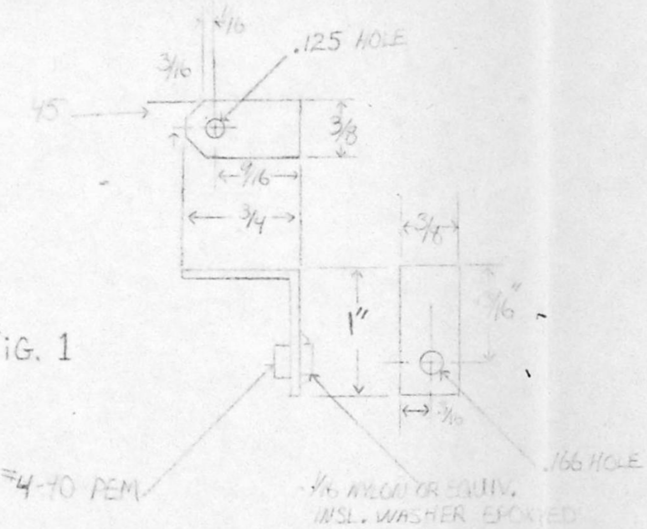


FiG. 1

PEICES PER DEFLECTION AMP.

FiG. 1	4
FiG. 2	1
FiG. 3	1

FiG. 2

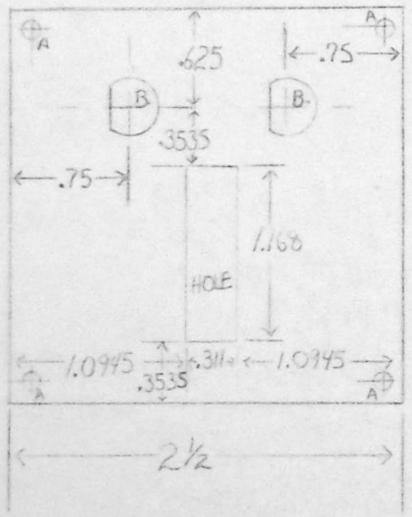
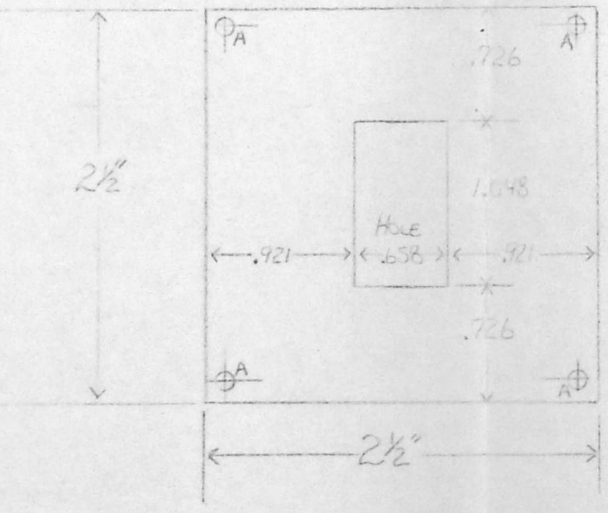
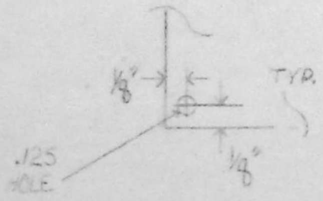


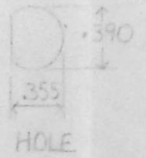
FiG. 3





DETAIL A
TYP. 8 PLACES (CORNERS)
FIGURES 2 & 3

DETAIL B
2 PLACES
FIG. 2



MATERIAL: 5052-H32 ALUM.
.062 THICK

FINISH: YELLOW IRRIDITE

TOLERANCE		
FRACT.	±	1/32
.XX	±	.015
.XXX	±	.005

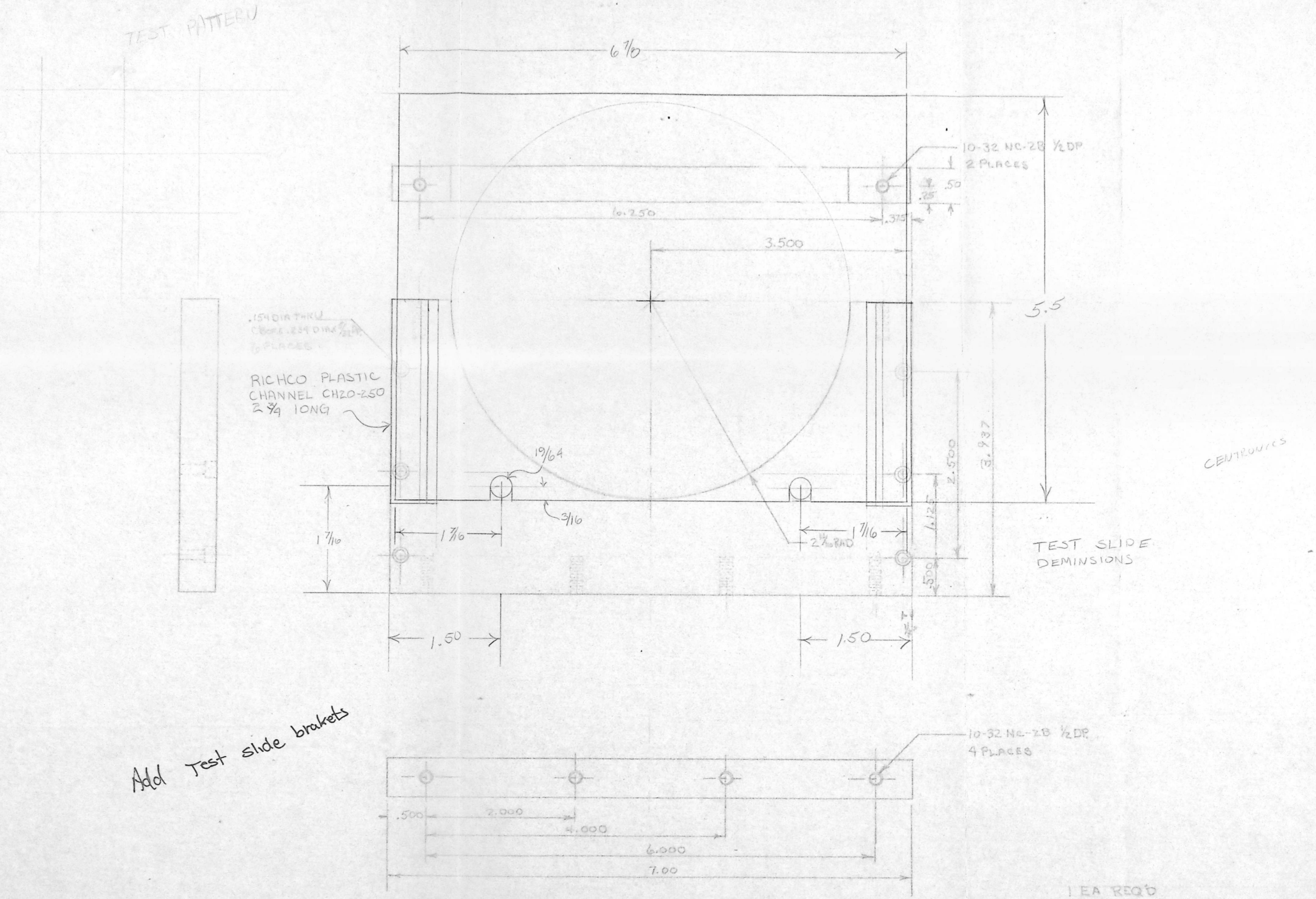
COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE.
DENVER, COLORADO 80223

	REVISIONS	BY	DATE
SCALE			
DATE Nov 25 80			
DR'N SD / CKD			
AP'VD			

TITLE DEFLECTION AMP. P.C. BRACKET
& CONNECTOR PLATES

NO CI-00314



Add Test slide brakets

1 EA REQ'D
MATERIAL: 6061-T6 ALUM PLATE
FINISH: YELLOW IRRIDITE

6 15/16

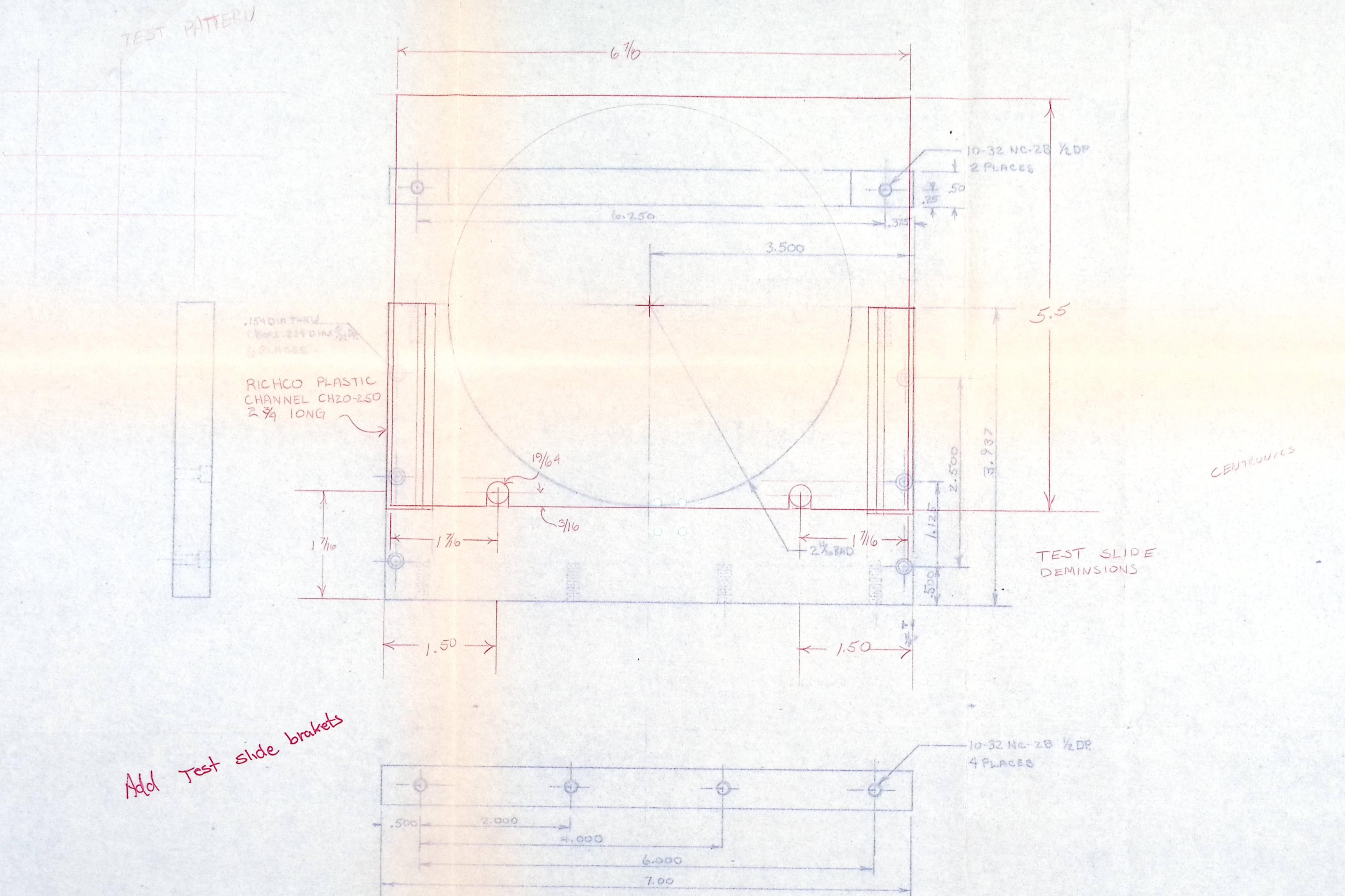
6 7/8

TOLERANCES	
FRACT	±1/32
.XX	±.015
.XXX	±.005

COMPUTER IMAGE CORPORATION
2475 W. 2nd. AVE.
DENVER, COLORADO 80223

SCALE	REVISION	BY	DATE
FULL			
DATE 1-11-72			
DR'N. E.R. · CK'D.			
AP'VD.			

TITLE ~~FRONT TUBE SUPPORT~~ TEST SLIDE
NO. CI-00131



Add Test slide brakets

1 EA REQ'D
MATERIAL: 6061-T6 ALUM PLATE
FINISH: YELLOW IRRIDITE

6 15/16

6 7/8

TOLERANCES	
FRACT	±1/32
.XX	±.015
.XXX	±.005

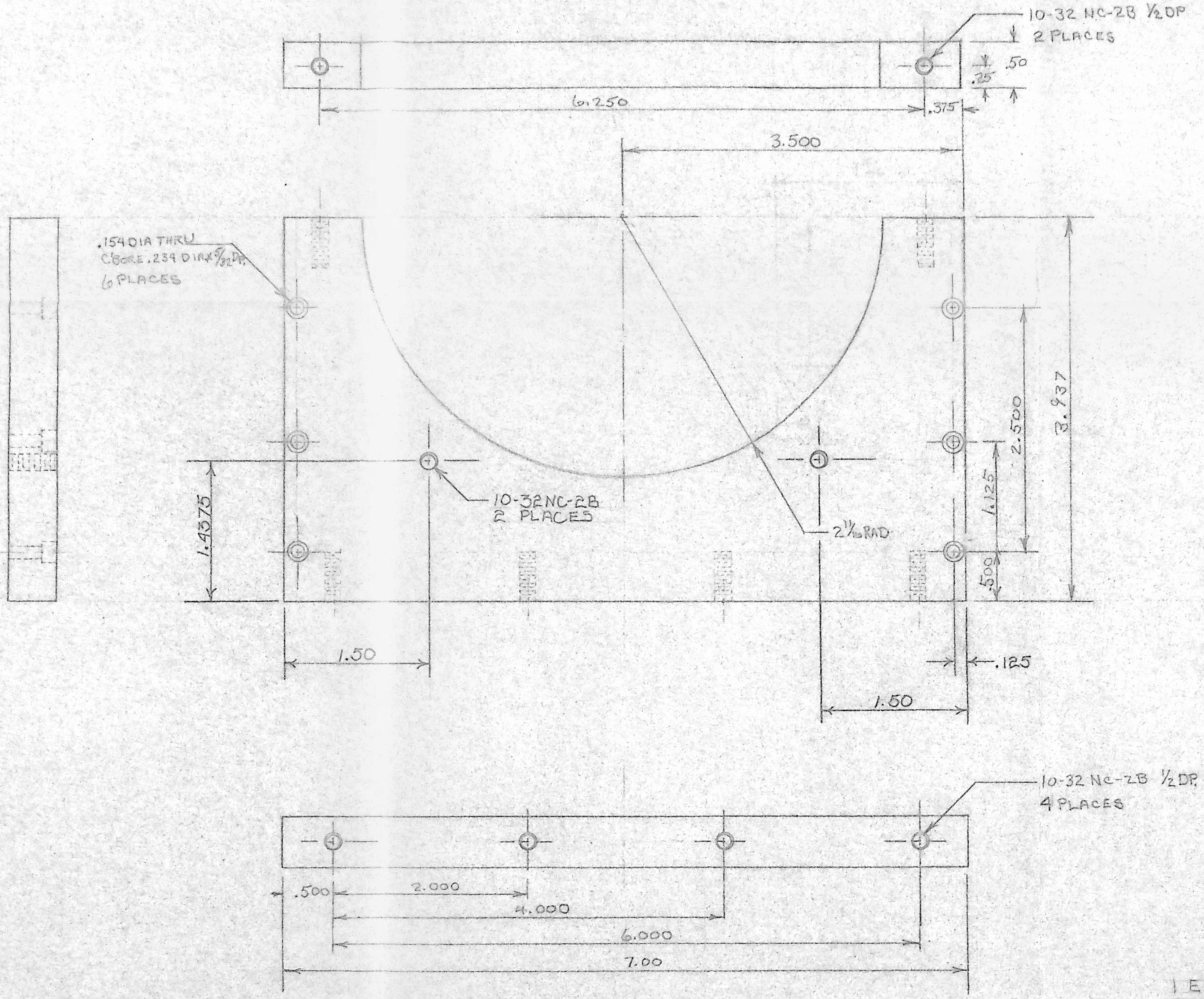
COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE.
DENVER, COLORADO 80223.

SCALE FULL		REVISION	BY	DATE
DATE 1-11-72.				
DR'N. E.R.	CK'D.			
AP'VD.				

TITLE ~~FRONT TUBE SUPPORT~~ TEST SLIDE

NO. CI-00131



1 EA REQ'D
MATERIAL: 6061-T6 ALUM PLATE
FINISH: CLEAR ANODIZE

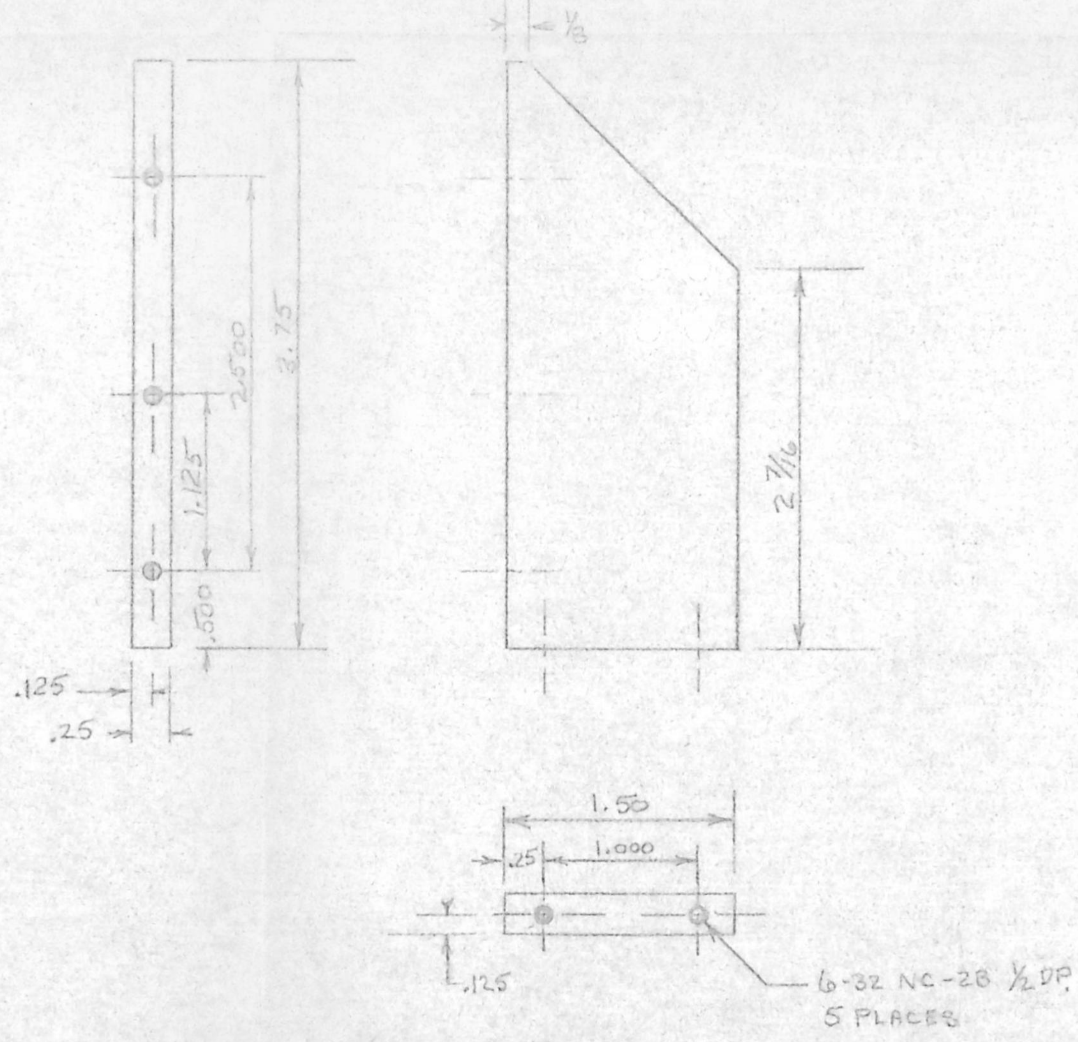
TOLERANCES	
FRACT	± 1/32
.XX	± .015
.XXX	± .005

COMPUTER
IMAGE
CORPORATION
2475 W. 2nd. AVE.
DENVER, COLORADO 80223.

SCALE		REVISION	BY	DATE
FULL				
DATE 1-11-72		(2) 10-32 HOLES ADDED	GSH	2/14/81
DR'N. E.R.	CK'D.			
AP'VD.				

TITLE FRONT TUBE SUPPORT

NO. CI-00131



2 EA. REQ'D.

MATERIAL: 6061-T6 ALUM PLATE

FINISH: YELLOW IRRIDITE

TOLERANCES	
FRACT	± 1/32
.XX	± .015
.XXX	± .005

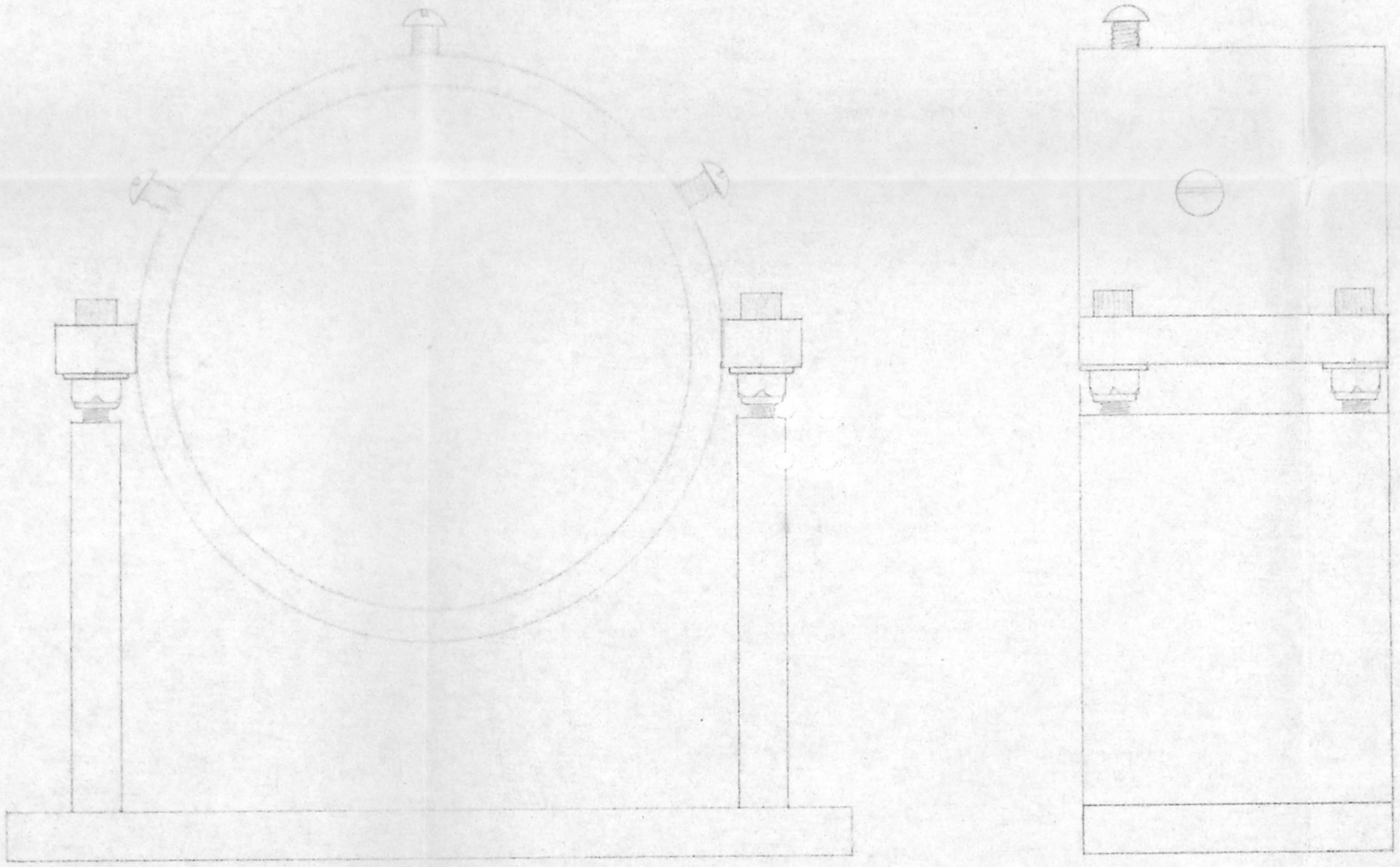
COMPUTER
IMAGE
CORPORATION

2475 W. 2nd. AVE.
DENVER, COLORADO 80223.

		REVISION	BY	DATE
SCALE FULL				
DATE 1-11-72				
DR'N. E.R.	CK'D.			
AP'VD.				

TITLE BRACE- FRONT TUBE SUPPORT

NO. CI-00132

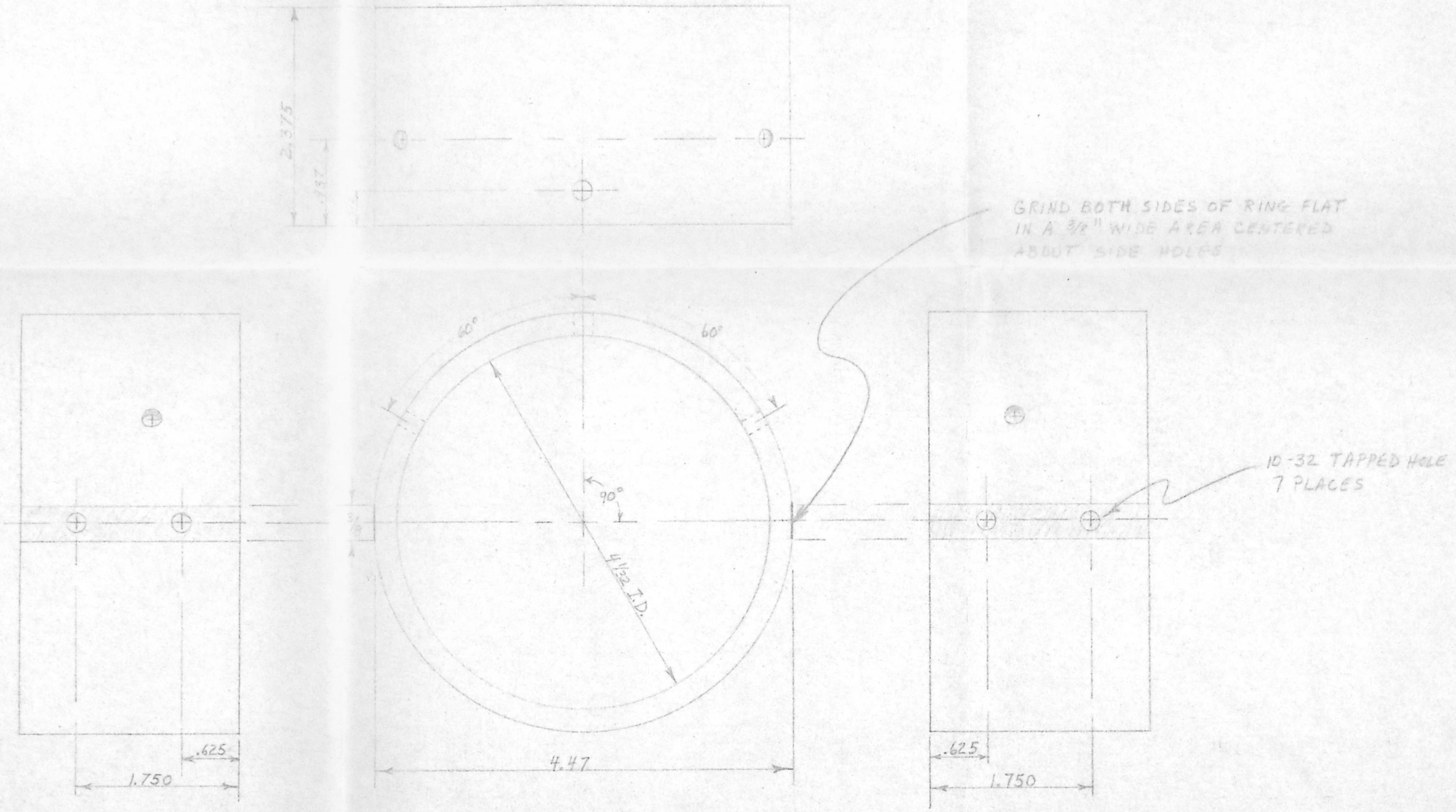


COMPUTER IMAGE

SCALE	REVISIONS	BY	DATE
DATE			
DR'N / CKD			
AP'VD			

TITLE
CRT DEFLECTION YOKE
MOUNTING ASSY

NO
CI-00191



GRIND BOTH SIDES OF RING FLAT
IN A 3/8" WIDE AREA CENTERED
ABOUT SIDE HOLES

10-32 TAPPED HOLE
7 PLACES

MATERIAL:
6061-T6 ALUMINUM PIPE, 4 1/2 INCH O.D.
1 EA REQ

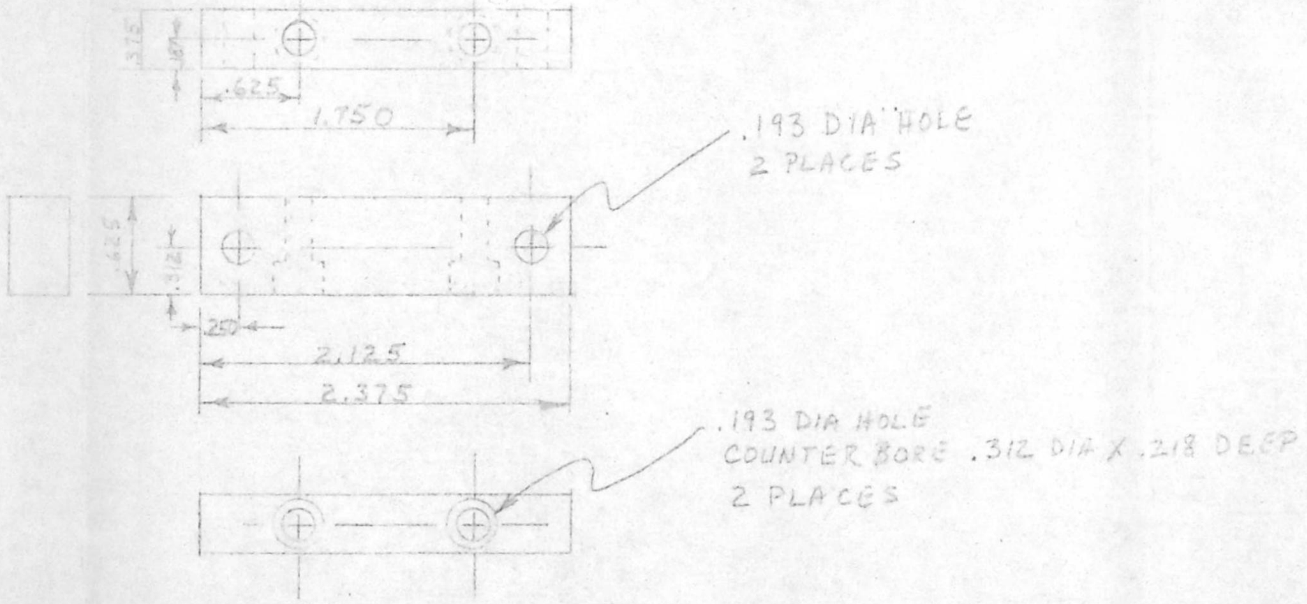
FINISH: YELLOW IRRIDITE

TOLERANCES	
FRACT	± 1/32
.XX	± .015
.XXX	± .005

COMPUTER IMAGE

SCALE	REVISIONS	BY	DATE
DATE			
DR'N / CKD			
AP'VD			

TITLE YOKE RING - MONITOR
NO. CI-00192



.193 DIA HOLE
2 PLACES

.193 DIA HOLE
COUNTER BORE .312 DIA X .218 DEEP
2 PLACES

MATERIAL;
6061-T6 ALUMINUM PLATE, 3/8 THK
4 EA REQ

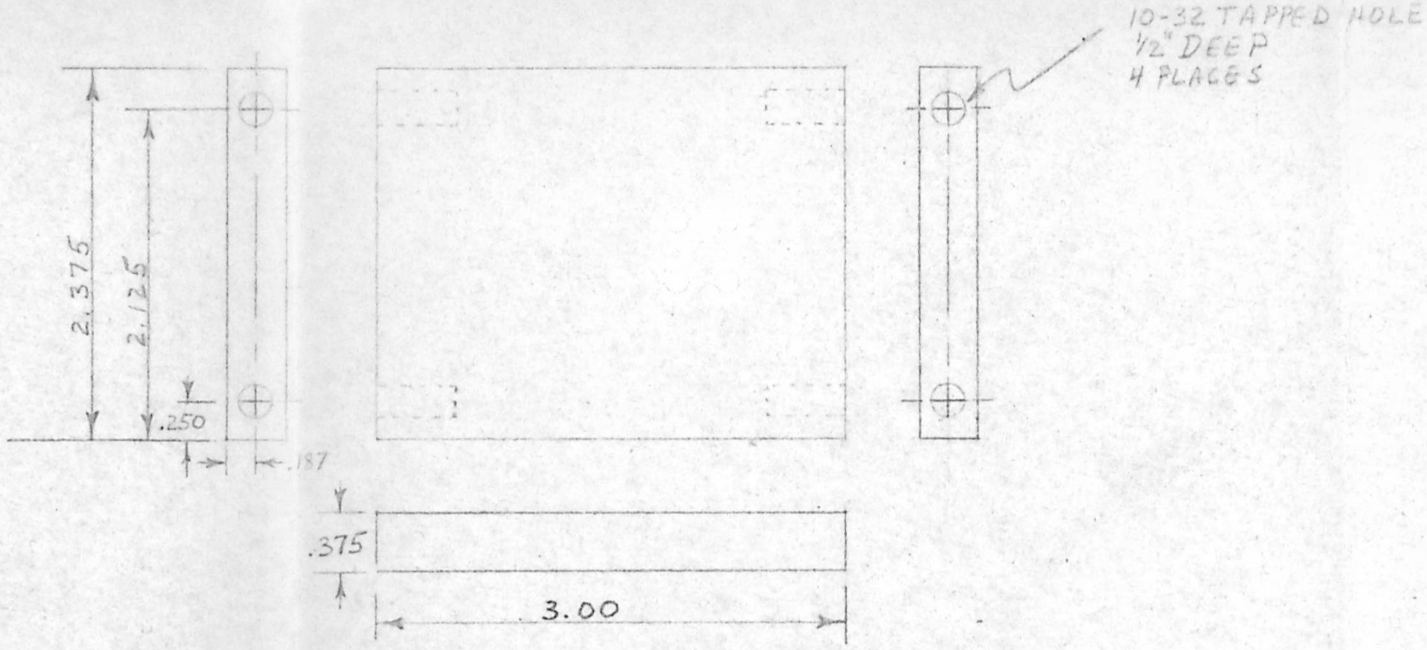
FINISH; YELLOW IRRIDITE

TOLERANCES	
FRACT	± 1/32
.XX	±.015
.XXX	±.005

COMPUTER IMAGE

SCALE		REVISIONS	BY	DATE
DATE				
DR'N	CKD			
AP'VD				

TITLE	NO
YOKE RING/ FOCUS COIL RING TAB	CI-00193



MATERIAL:
6061-T6 ALUMINUM PLATE, 3/8" THK.
4 EA REQ.

FINISH: YELLOW IRRIDITE

TOLERANCES	
FRACT	± 1/32
.XX	± .015
.XXX	± .005

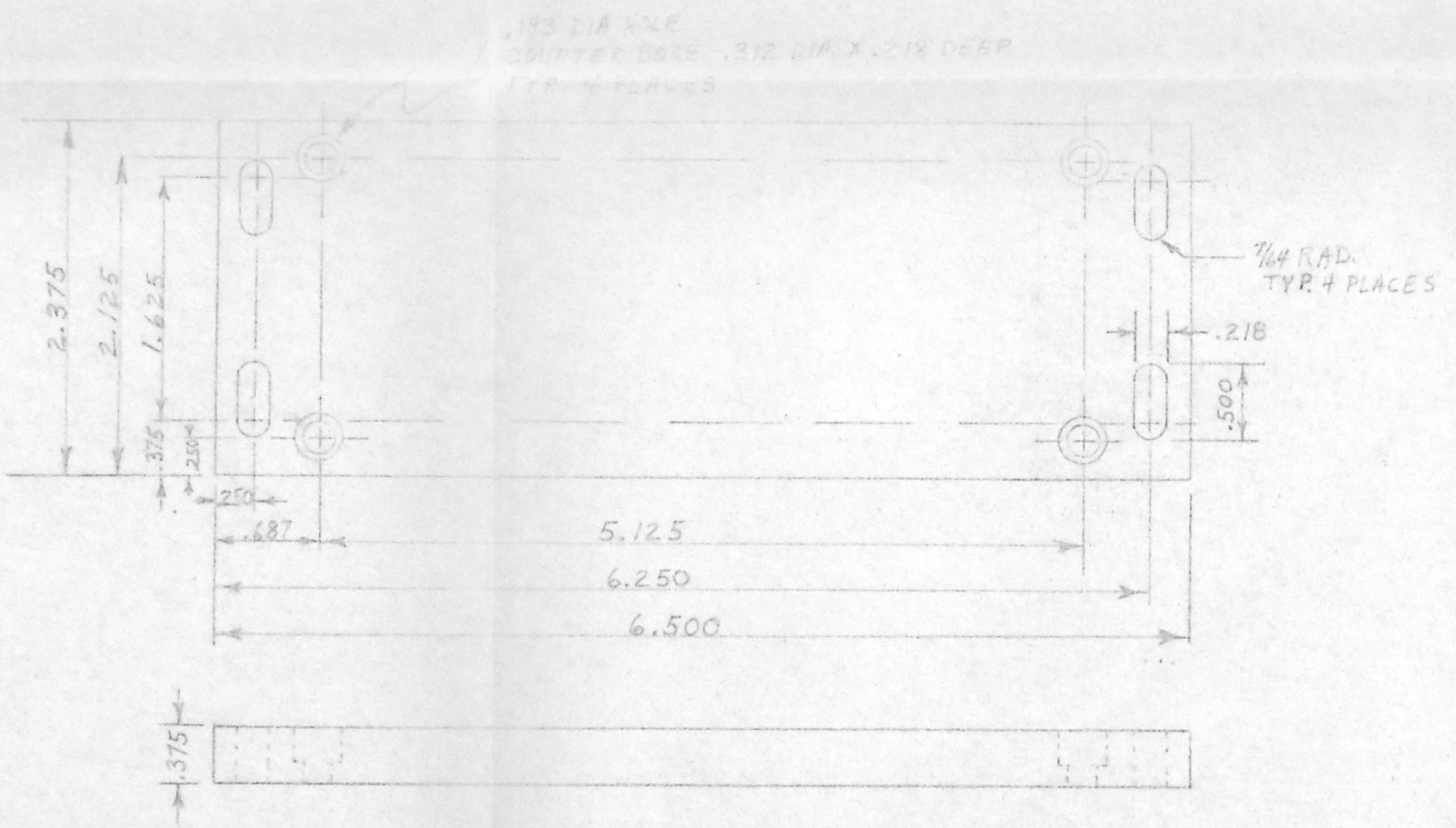
COMPUTER IMAGE

SCALE	REVISIONS	BY	DATE
DATE			
DR N / CKD			
AP VD			

TITLE YOKE RING/
FOCUS COIL RING SUPPORT

NO CI-00194

BRUNING 40-105



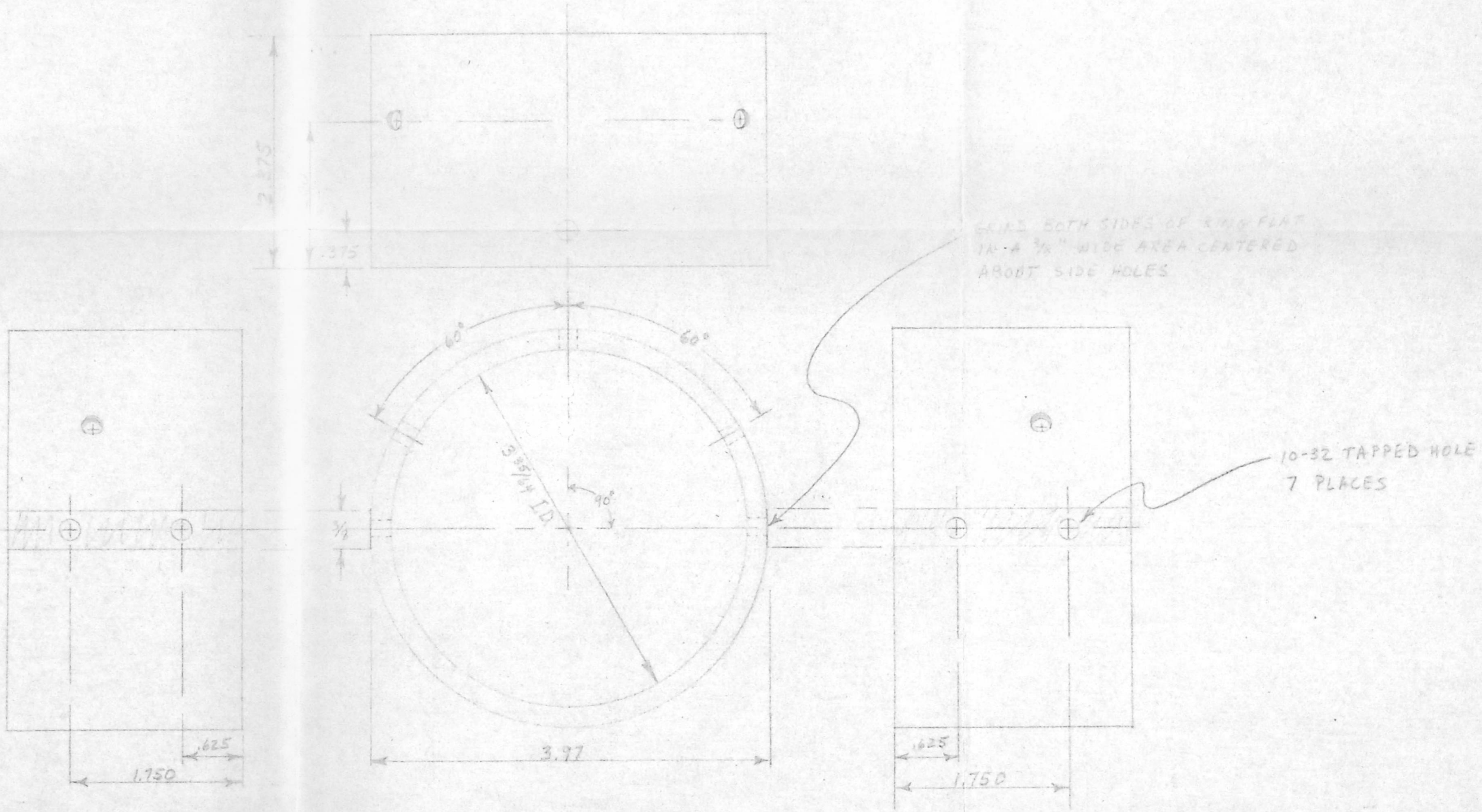
MATERIAL
6061-T6 ALUMINUM PLATE, 3/8" THK
1 EA REQ
FINISH: YELLOW IRRIDITE

TOLERANCES	
FRACT	± 1/32
.XX	± .015
.XXX	± .005

COMPUTER IMAGE

SCALE	REVISIONS	BY	DATE
DATE			
DRN / CKD			
APVD			

TITLE YOKE RING SUPPORT BASE	NO. CI-00195


2.375
.375
60°
60°
3 35/64 I.D.
90°
3/8
GRIND BOTH SIDES OF RING FLAT IN A 3/8" WIDE AREA CENTERED ABOUT SIDE HOLES
10-32 TAPPED HOLE 7 PLACES
.625
1.750
3.97
.625
1.750

MATERIAL:
6061-T6 ALUMINUM PIPE, 4 INCH O.D.
1 EA REQ

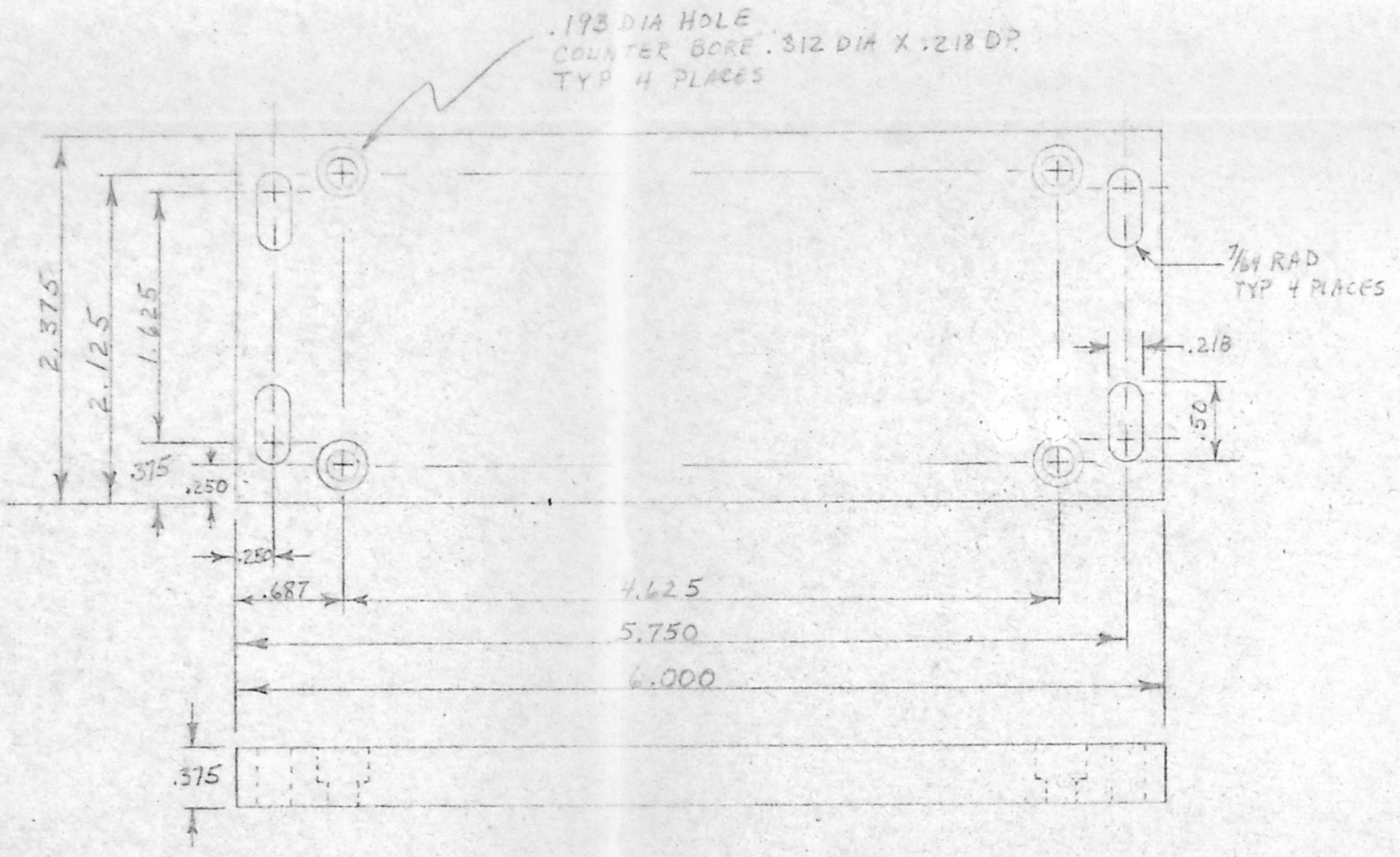
FINISH: YELLOW IRRIDITE

TOLERANCES	
FRACT	± 1/32
.XX	± .015
.XXX	± .005

COMPUTER IMAGE

SCALE	REVISIONS	BY	DATE
DATE			
DR'N / CKD			
AP'VD			

TITLE FOCUS COIL RING - MONITOR
NO CI-00197



MATERIAL:

6061-T6 ALUMINUM PLATE, 3/8" THK.

1 REQ.

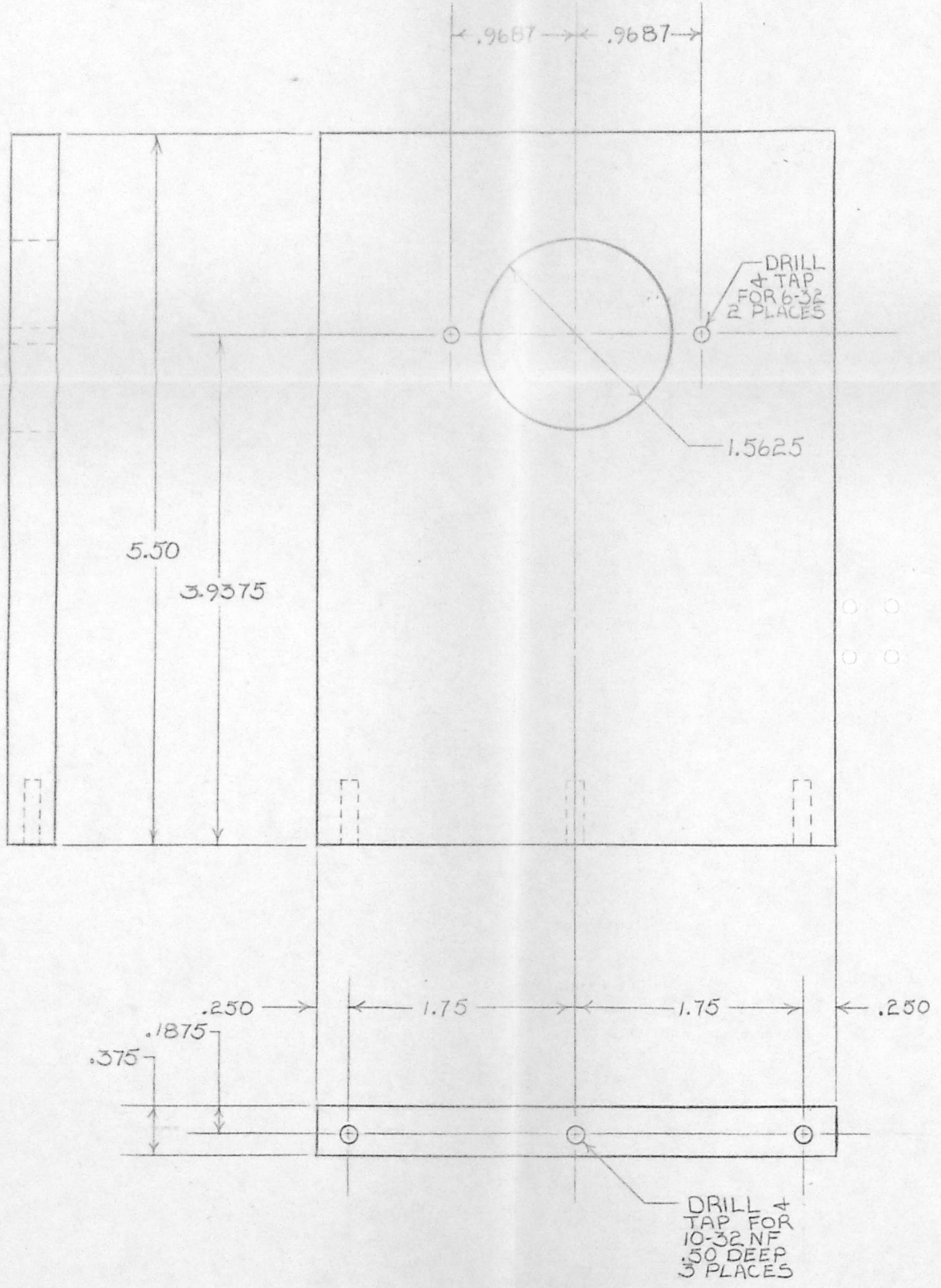
FINISH: YELLOW IRRIDITE

TOLERANCES

FRACT"	± 1/32
.XX	±.015
.XXX	±.005

COMPUTER IMAGE

SCALE	REVISIONS	BY	DATE
DATE			
DR'N CKD			
AP VD			
TITLE FOCUS COIL RING SUPPORT BASE	NO. CI-00200		


.9687
.9687
DRILL & TAP FOR 6-32 2 PLACES
1.5625
5.50
3.9375
.250
1.75
1.75
.250
.1875
.375
DRILL & TAP FOR 10-32 NF .50 DEEP 3 PLACES

NOTES
1. MATERIAL IS 6061-T651 ALUM.
2. FINISH IS CLEAR ANODIZE

COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE.
DENVER, COLORADO 80223

TOLERANCE	
FRACT.	± 1/32
XX	± .015
.XXX	± .005

	REVISIONS	BY	DATE
SCALE FULL			
DATE 2/11/81			
DR'N GSH CK'D			
AP'VD			

TITLE CRT REAR TUBE SUPPORT

NO CI-00201A

Mechanical

	Camera Drawer Base Plate	
CI-00097	Front Yolk mount plate (overlap)	
CI-00098	Rear Yolk mount Plate "	
C1-00256	overlap camera hood	
C1-00313	High Voltage supply cover	
C1 00312	overlap card cage ass.	
T-902-6½	Scanbe Box 6½"	6
A305-A	Scanbe conn. mount	6
T-309-60	Scanbe card guide	6
	CAMER MOUNTING BRACKET	
C-305-24-ABZO	ACCURIDE RACK SLIDES	1 PAIR
C5403	FRONT MOUNTING BRACKET	"
C5413	REAR mounting BRACKET	"
T-101-500	Scanbe ½" SPACERS	6 ~~12~~
T-101-1000	1" SPACERS	24
	" ¼" "	12 ~~6~~

Computor Image
Material List
Camera Overlap Drawer

—Electrical—

SM 151	write video amp tube socket	
SM 126	overlap video preamp	
7120 Hi Resolution	Cohu Camera	
CF 2513	Fujinon Camera lens	
845084Z-004	½" C mount lens adapter	
SM 121 B	High Voltage Power Supply	
4532 SILICON DIODE	RCA TUBE	
SM 117 E	OVERLAP CAMERA YOLK DRIVERS	2
VYLFA-915	CLEVELAND YOLK	
SM 152		
#1539	Gen Radio Strobe Slave	
2VK22D/1-2	Viking EDGE CONN. 44 TERMINAL	3
2VK10D/1-2	Viking " " 20 "	1
	~~CAMERA CABLE CONN. RT ANGLE~~	

Cletronics (216) 239-1351
yoke for overlap camera

1684 Medina
Medina, Ohio

LH - 110 µh   LV - 91 µh
RF - 395 Ω   RA - 140 Ω
41 gauss   0-4 gauss

VYLFA-915
1" vidicon yoke

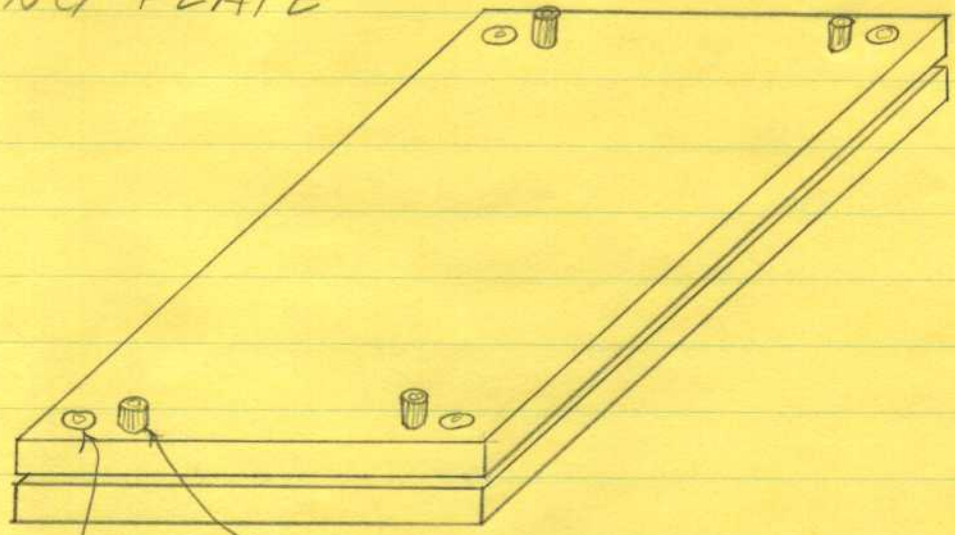
156.82   Qty 6-15
Better yoke 106.36   Qty 2-9 with Tube clamp and image shield

Jim Riffe - sales

LEVELING PLATE

4-27-81

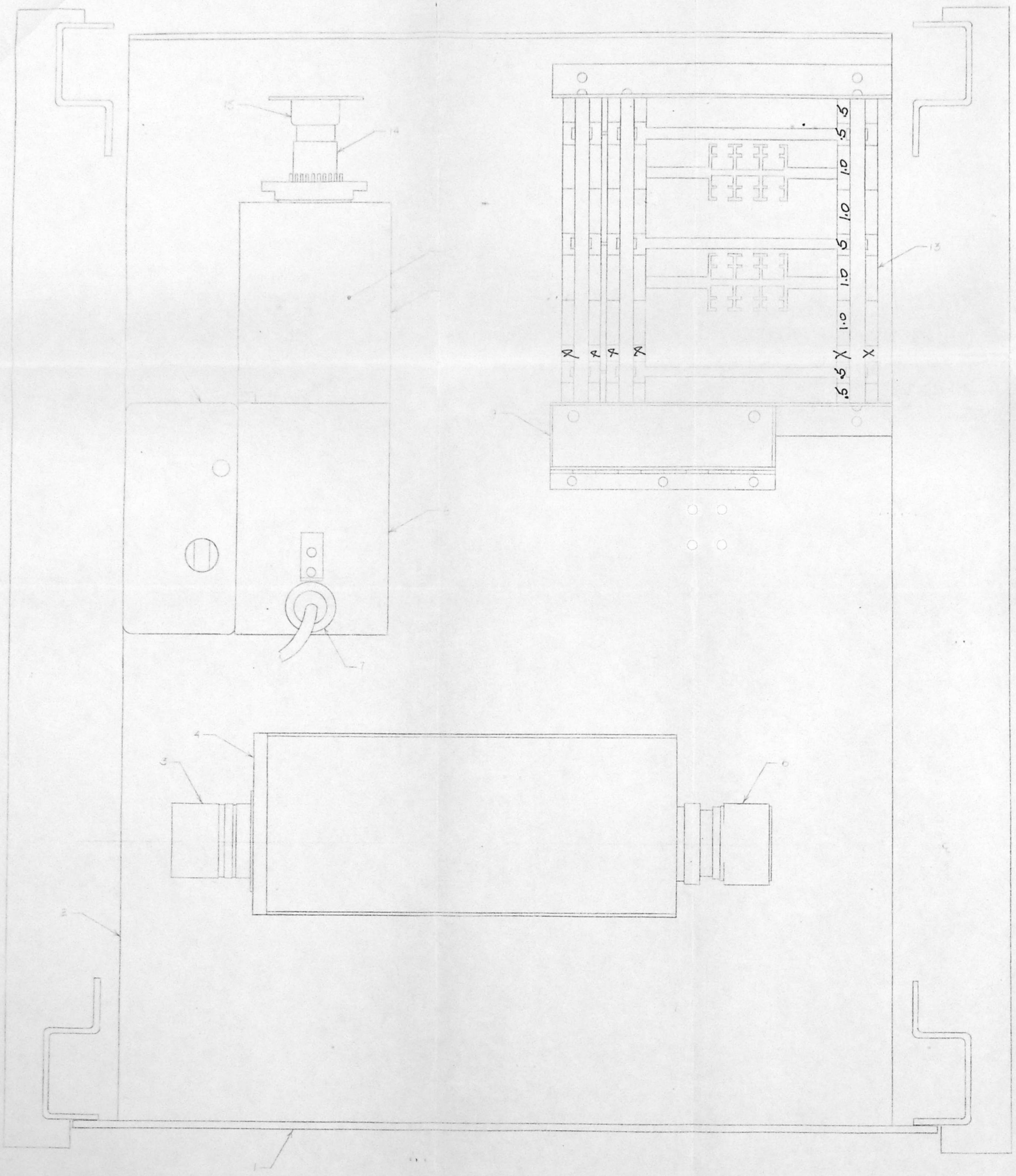
9#



HEX CAP SCREW HOLE IN TOP PLATE IS CLEAR, BOTTOM IS THREADED

HEX SOCKET SET SCREW TOP PLATE ONLY, DRILL + TAP

LOOSEN CAP SCREWS, ADJUST SET SCREWS TO LEVEL. TIGHTEN CAP SCREWS TO LOCK.



NO.	PART DESCRIPTION	DETAIL DRAWING NO.
1	CAMERA DRAWER BASE PLATE	CI-00317
2	CAMERA DRAWER FRONT PANEL	
3	CAMERA LENS	
4	COHU CAMERA	
5	~~X-Y ADJUSTMENT ASSEMBLY~~ cumera mounting Bracket	
6	CAMERA CABLE CONNECTOR	
7	STROBOTRON LAMP ASSEMBLY	
8	OVERLAP CAMERA HOOD	CI-00256
9	HIGH VOLTAGE SUPPLY CAGE	
10	GENERAL RADIO STOBOSLAVE	
11	OVERLAP CAMERA YOKE ASSEMBLY	
12	OVERLAP CAMERA VIDEO PREAMP	SM-126
13	OVERLAP CAMERA CARD CAGE ASSEM.	
14	PICKUP TUBE	
15	WRITE VIDEO AMP ASSEMBLY	SM-151

COMPUTER
IMAGE
CORPORATION

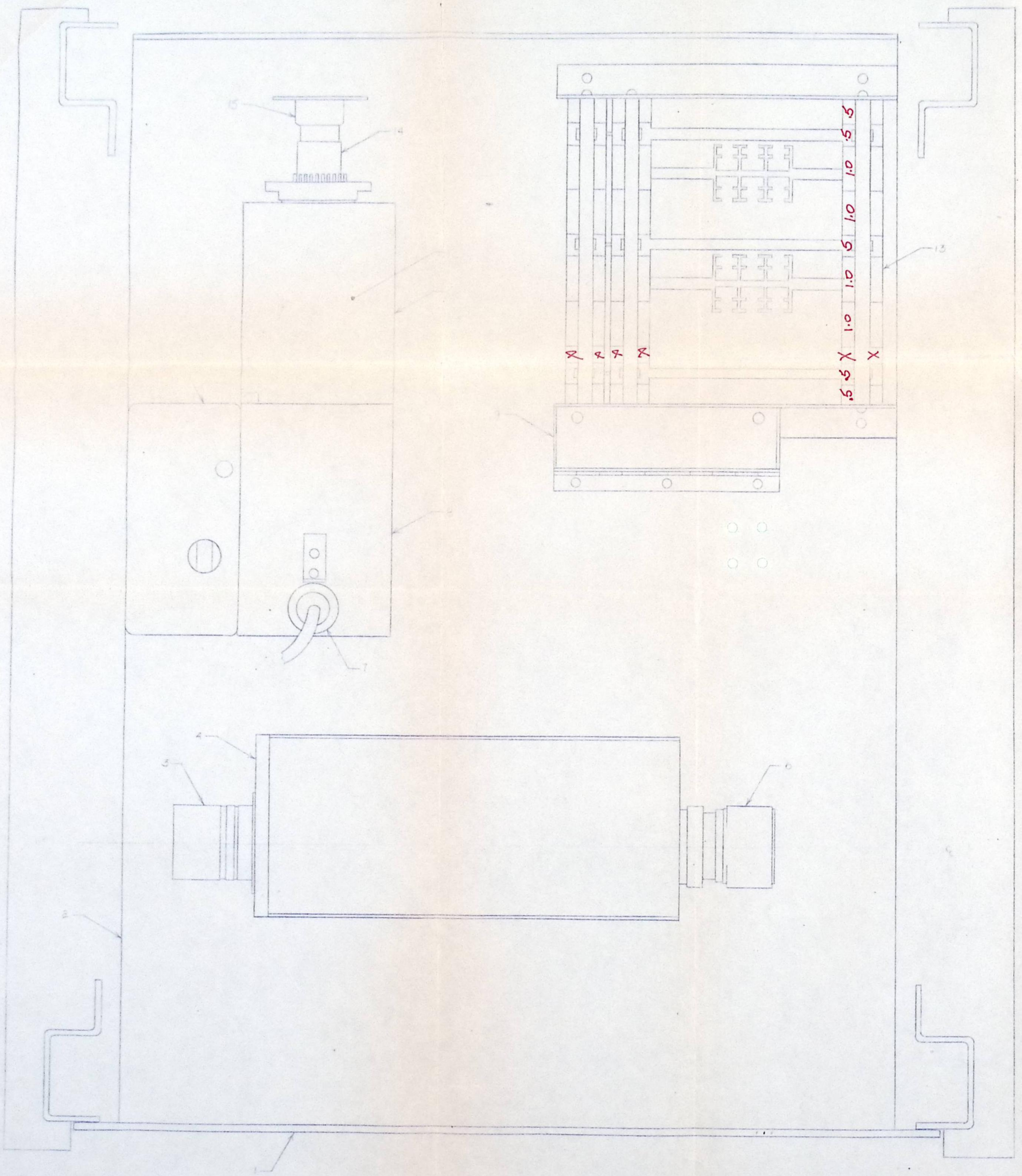
2475 W. 2nd AVE.
DENVER, COLORADO 80223

SCALE 1/2" = 1"	REVISIONS	BY	DATE
DATE			
DR'N GSM / CKD			
AP'VD			

TOLERANCE		
FRACT.	±	1/32
.XX	±	.015
.XXX	±	.005

TITLE SCANCONVERTER
CAMERA DRAWER

NO CI-00316



NO.	PART DESCRIPTION	DETAIL DRAWING NO.
1	CAMERA DRAWER BASE PLATE	CI-00317
2	CAMERA DRAWER FRONT PANEL	
3	CAMERA LENS	
4	COHU CAMERA	
5	~~X-Y ADJUSTMENT ASSEMBLY~~ camera mounting Bracket	
6	CAMERA CABLE CONNECTOR	
7	STROBOTRON LAMP ASSEMBLY	
8	OVERLAP CAMERA HOOD	CI-00256
9	HIGH VOLTAGE SUPPLY CAGE	
10	GENERAL RADIO STOBOSLAVE	
11	OVERLAP CAMERA YOKE ASSEMBLY	
12	OVERLAP CAMERA VIDEO PREAMP	SM-126
13	OVERLAP CAMERA CARD CAGE ASSEM.	
14	PICKUP TUBE	
15	WRITE VIDEO AMP ASSEMBLY	SM-151

COMPUTER
IMAGE
CORPORATION

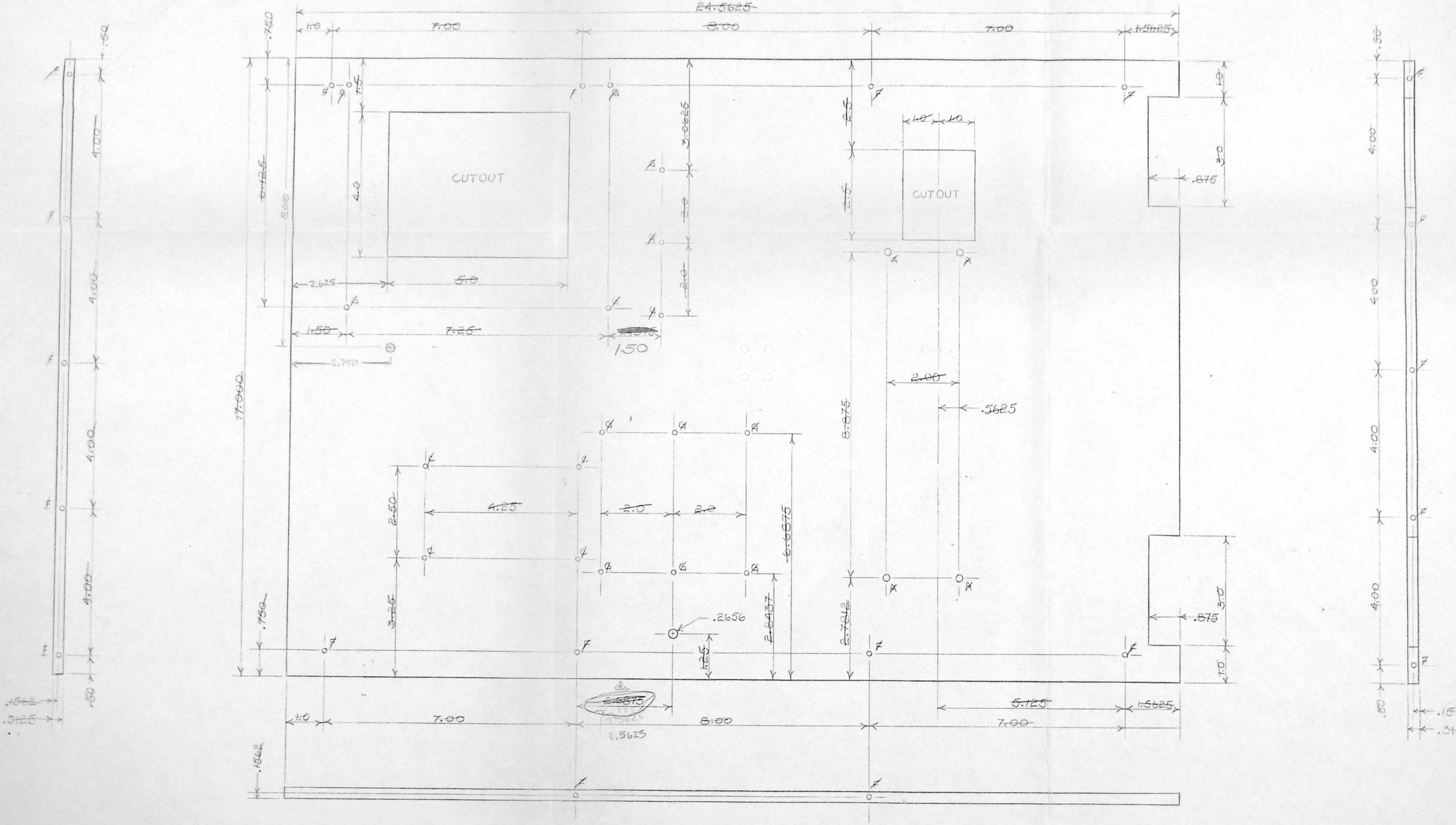
2475 W. 2nd AVE.
DENVER, COLORADO 80223

TOLERANCE	
FRACT.	± 1/32
.XX	± .015
.XXX	± .005

		REVISIONS	BY	DATE
SCALE 1/2" = 1"				
DATE				
DR'N GSH	CKD			
AP'VD				

TITLE SCANCONVERTER
CAMERA DRAWER

NO CI-00316



HOLE CODES		QTY
A	.196 CLEAR FOR #10 SCREW	4
AA B B B		
C CC	.144 CLEAR FOR #6 SCREW	4
D E		
F	.136 TAP FOR 8-32NC	26 ✓
#	.107 TAP FOR 6-32NC	13 ✓

NOTES:
LETTER CLOSEST HOLE IS HOLE CODE
ALL EDGE HOLES ARE 1.00 DEEP
ROUNDED CORNERS ON CUTOUTS ACCEPTABLE
ALL DIMENSIONS ARE IN INCHES
MATERIAL IS 6061-T651 ALUM.
FINISH IS BLACK ANODIZE

TOLERANCE		
FRACT.	±	1/32
XX	±	.015
XXX	±	.005

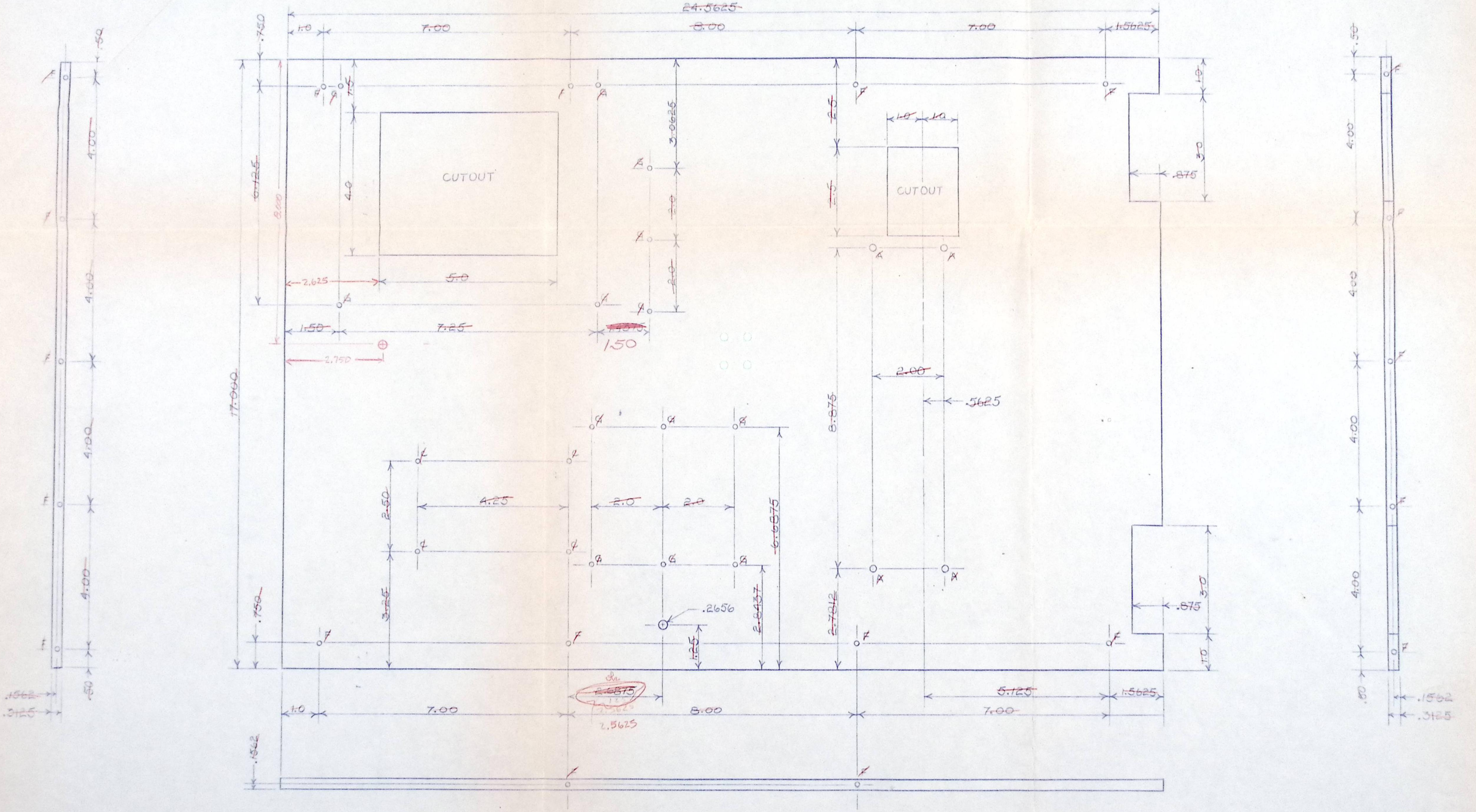
COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE.
DENVER, COLORADO 80223

	REVISIONS	BY	DATE
SCALE ½" = 1"			
DATE 1-22-81			
DR'N GSH / CKD			
AP'VD			

TITLE BASE PLATE
SCANCONVERTER
CAMERA DRAWER

NO CI-00317



HOLE CODES		QTY
~~A~~ AA	.190 CLEAR FOR #10 SCREW	4 ✓
B ~~B~~ BB ~~C~~ CC	.144 CLEAR FOR #6 SCREW	4 ✓
D E ~~F~~	.136 TAP FOR 8-32NC	25 ✓
#	.107 TAP FOR 6-32NC	13 ✓

NOTES:
LETTER CLOSEST HOLE IS HOLE CODE
ALL EDGE HOLES ARE 1.00 DEEP
ROUNDED CORNERS ON CUTOUTS ACCEPTABLE
ALL DIMENSIONS ARE IN INCHES
MATERIAL IS 6061-T651 ALUM.
FINISH IS BLACK ANODIZE

TOLERANCE	
FRACT	± 1/32
.XX	± .015
.XXX	± .005

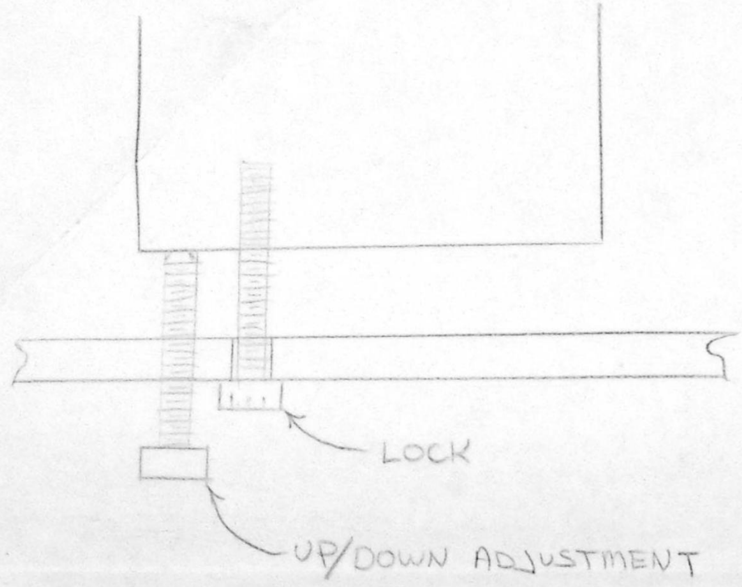
COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE.
DENVER, COLORADO 80223

	REVISIONS	BY	DATE
SCALE ½" = 1"			
DATE 1-22-81			
DR'N GSH CK'D			
AP'VD			

TITLE ~~BASE PLATE~~
SCANCONVERTER
CAMERA DRAWER

NO CI-00317



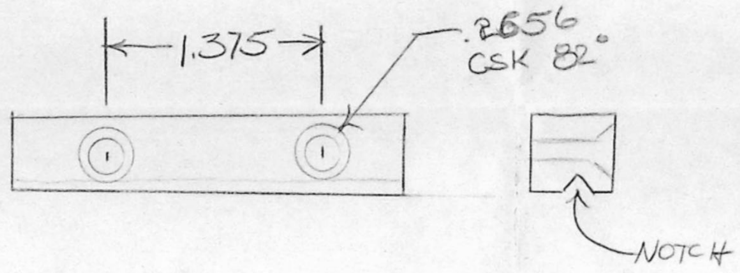
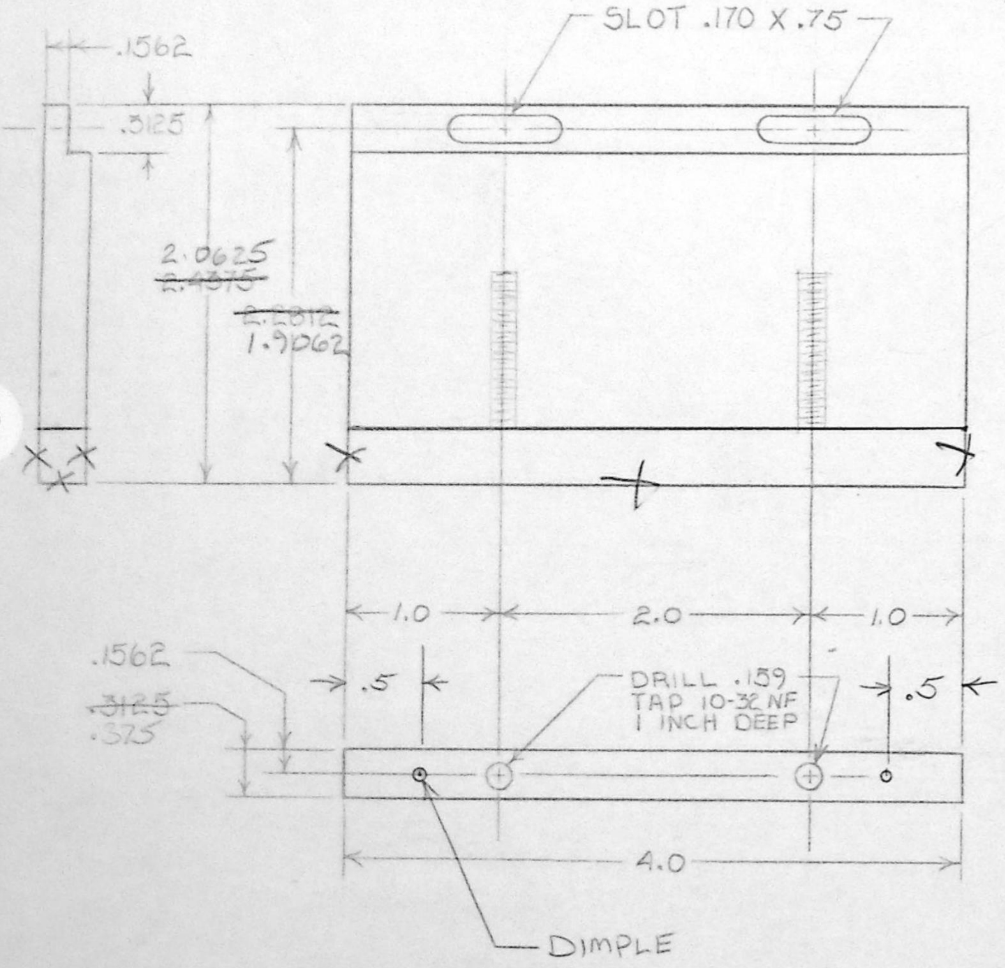
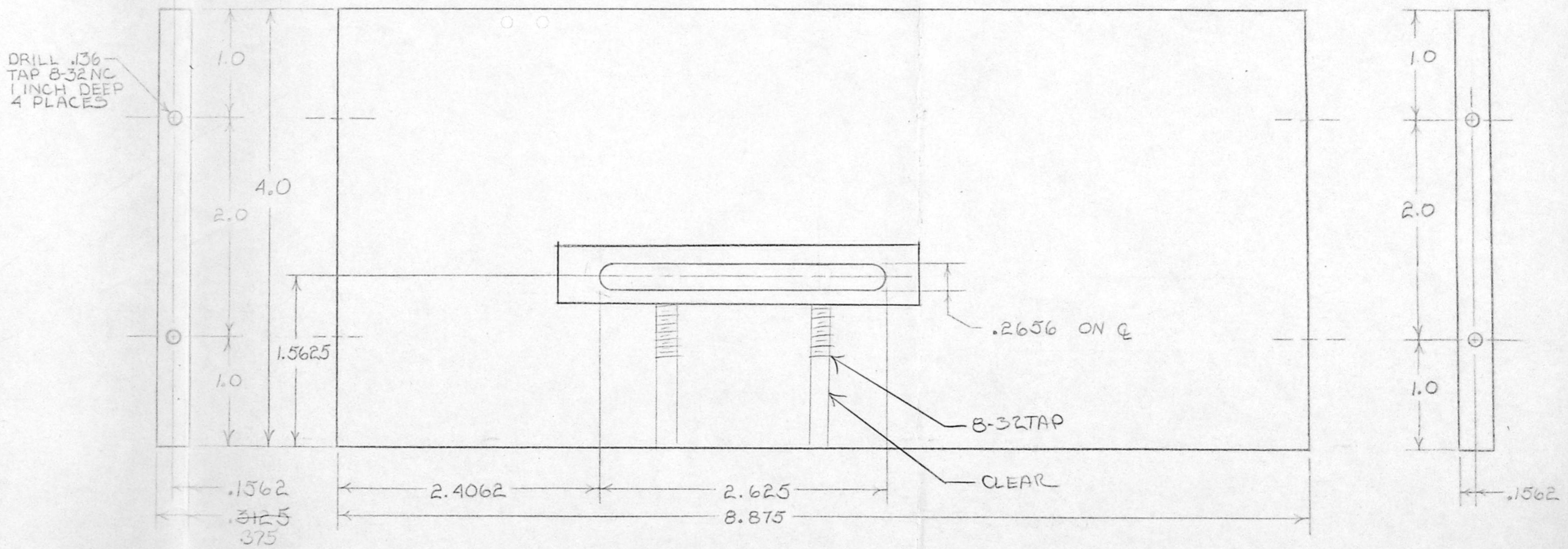


FIGURE 1
2 PIECES / ASSEMBLY

FIGURE 2
1 PIECE / ASSEMBLY





NOTES
MATERIAL IS 6061-T651 ALUM. 7/8
FINISH IS BLACK ANODIZE
ALL DIMENSIONS IN INCHES

TOLERANCE		
FRACT	±	1/32
.XX	±	.015
.XXX	±	.005

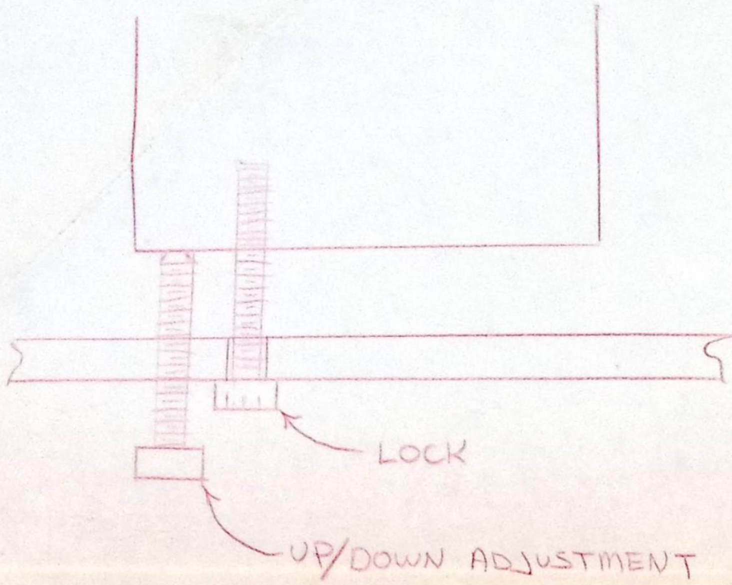
COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE.
DENVER, COLORADO 80223

		REVISIONS	BY	DATE
SCALE FULL				
DATE 1-29-81				
DR'N GSH	CK'D			
AP'VD				

TITLE SCANCONVERTER CAMERA MOUNT ASSY

NO CI-00319



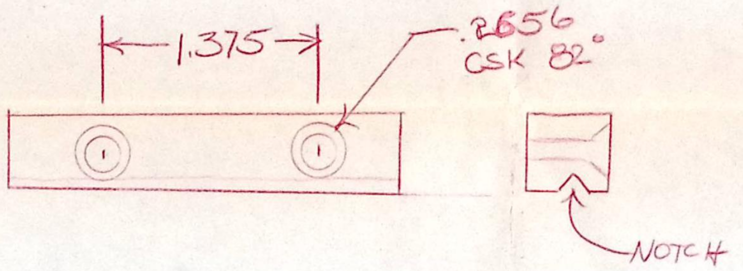
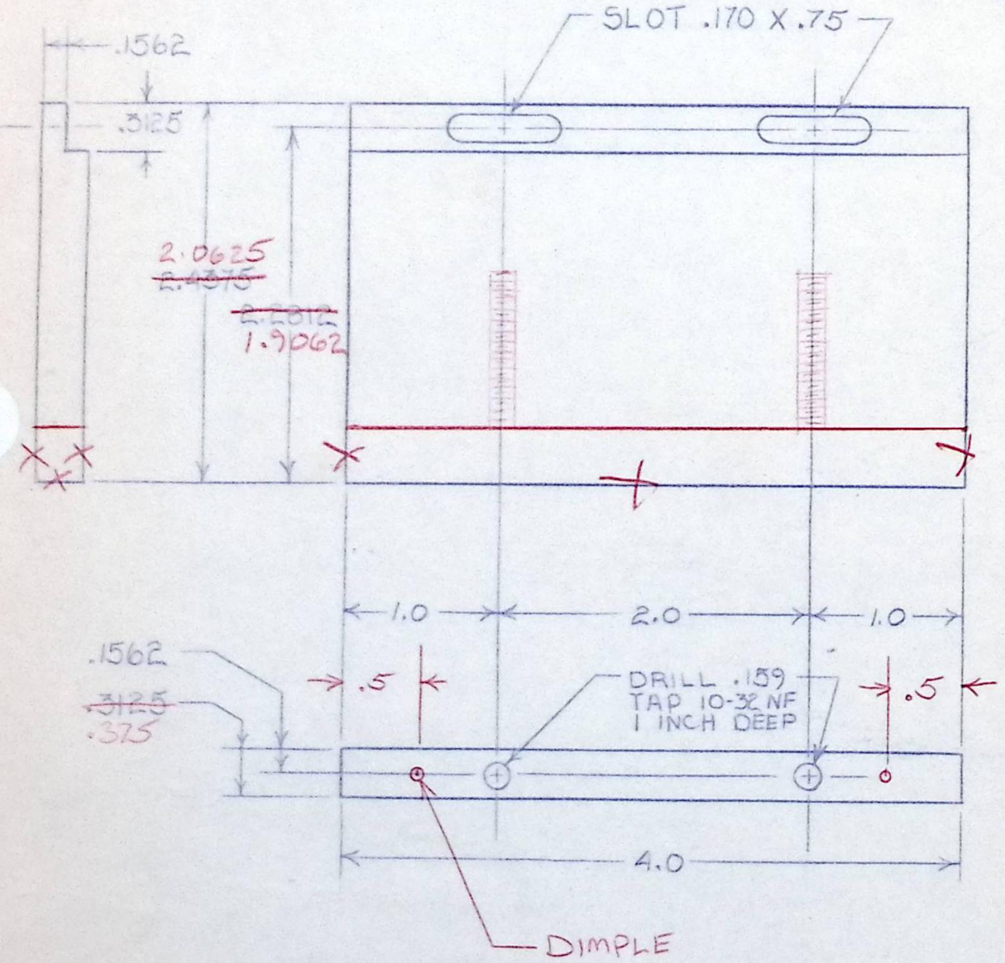
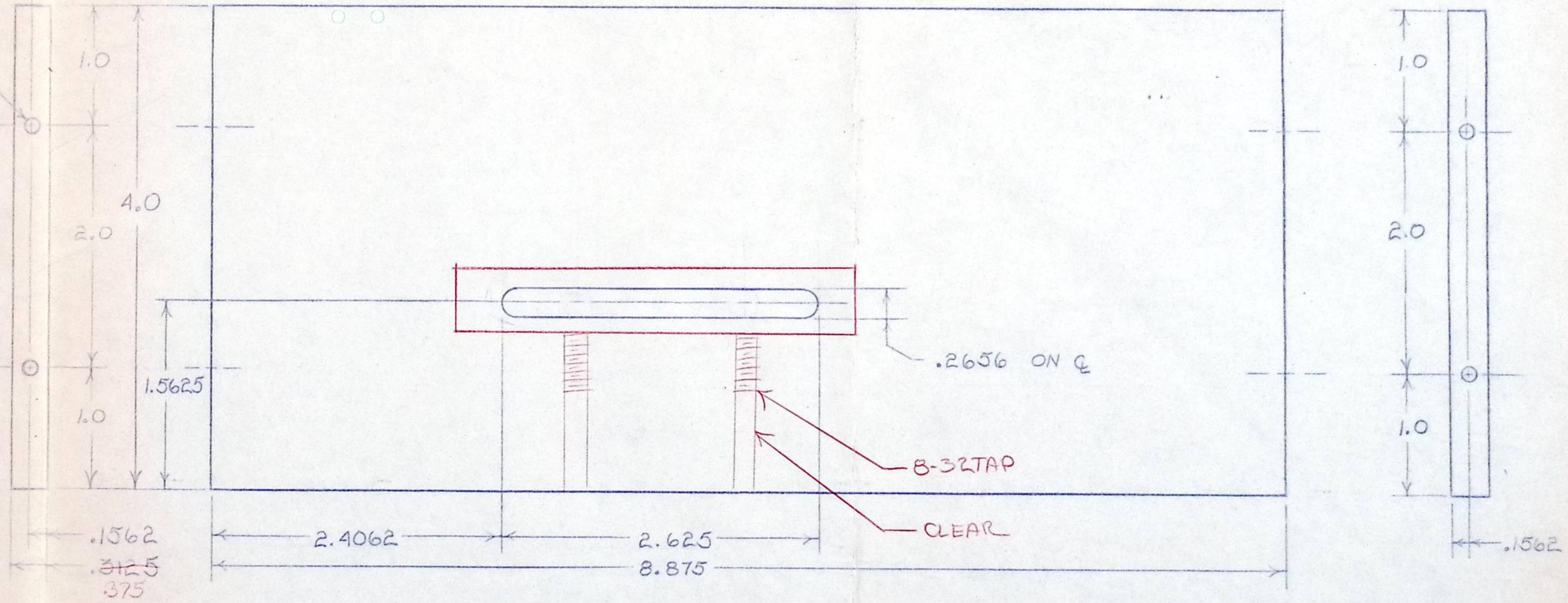


FIGURE 1
2 PIECES / ASSEMBLY

FIGURE 2
1 PIECE / ASSEMBLY





NOTES

MATERIAL IS 6061-T651 ALUM. 3/8
FINISH IS BLACK ANODIZE
ALL DIMENSIONS IN INCHES

TOLERANCE		
FRACT.	±	1/32
.XX	±	.015
.XXX	±	.005

COMPUTER
IMAGE
CORPORATION

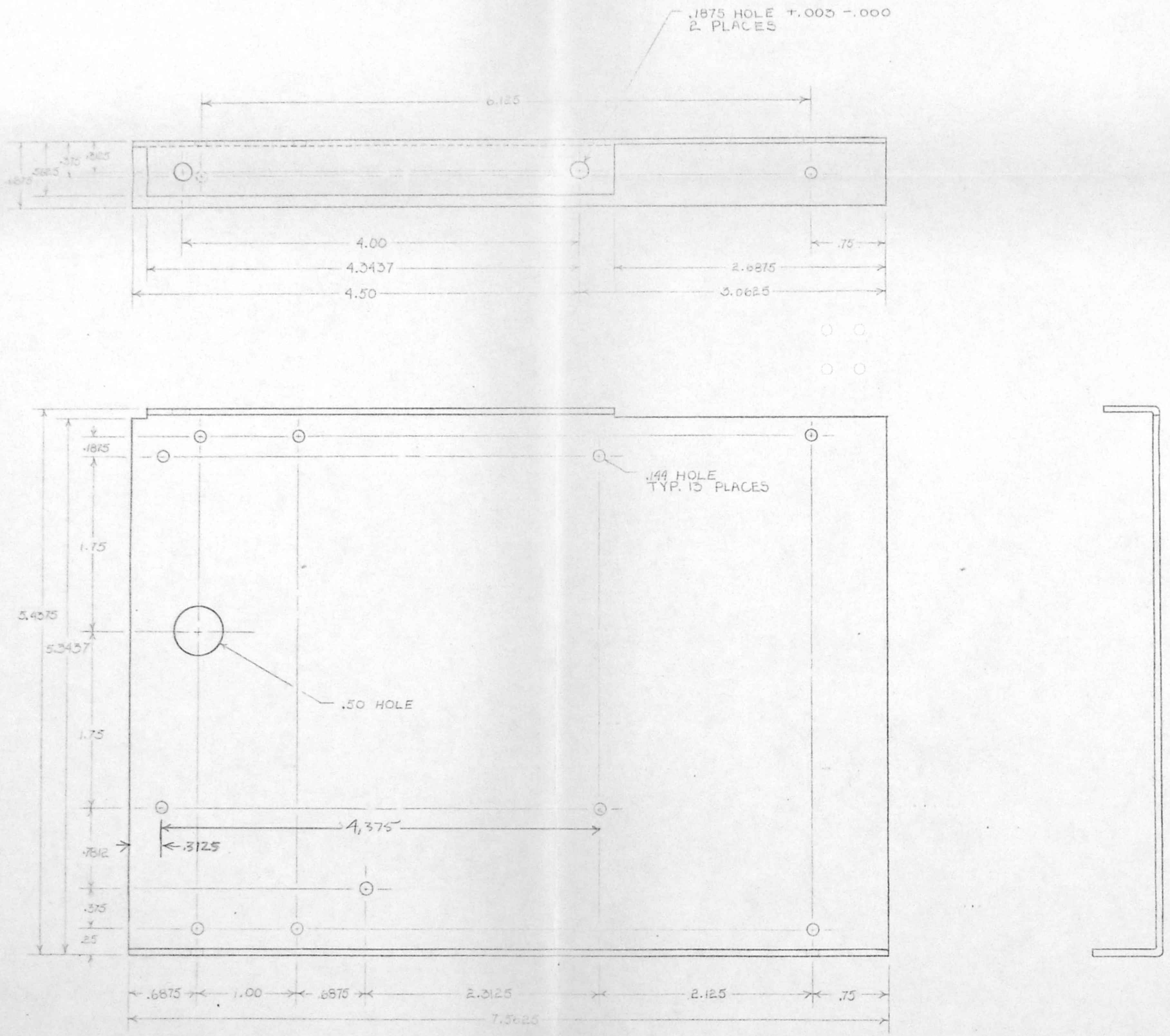
2475 W. 2nd AVE.
DENVER, COLORADO 80223

SCALE FULL
DATE 1-29-81
DR'N GSH
CK'D
AP'VD

REVISIONS	BY	DATE

TITLE SCANCONVERTER CAMERA MOUNT ASSY

NO CI-00319



TOLERANCE		
FRACT.	±	1/32
.XX	±	.015
.XXX	±	.005

COMPUTER
IMAGE
CORPORATION

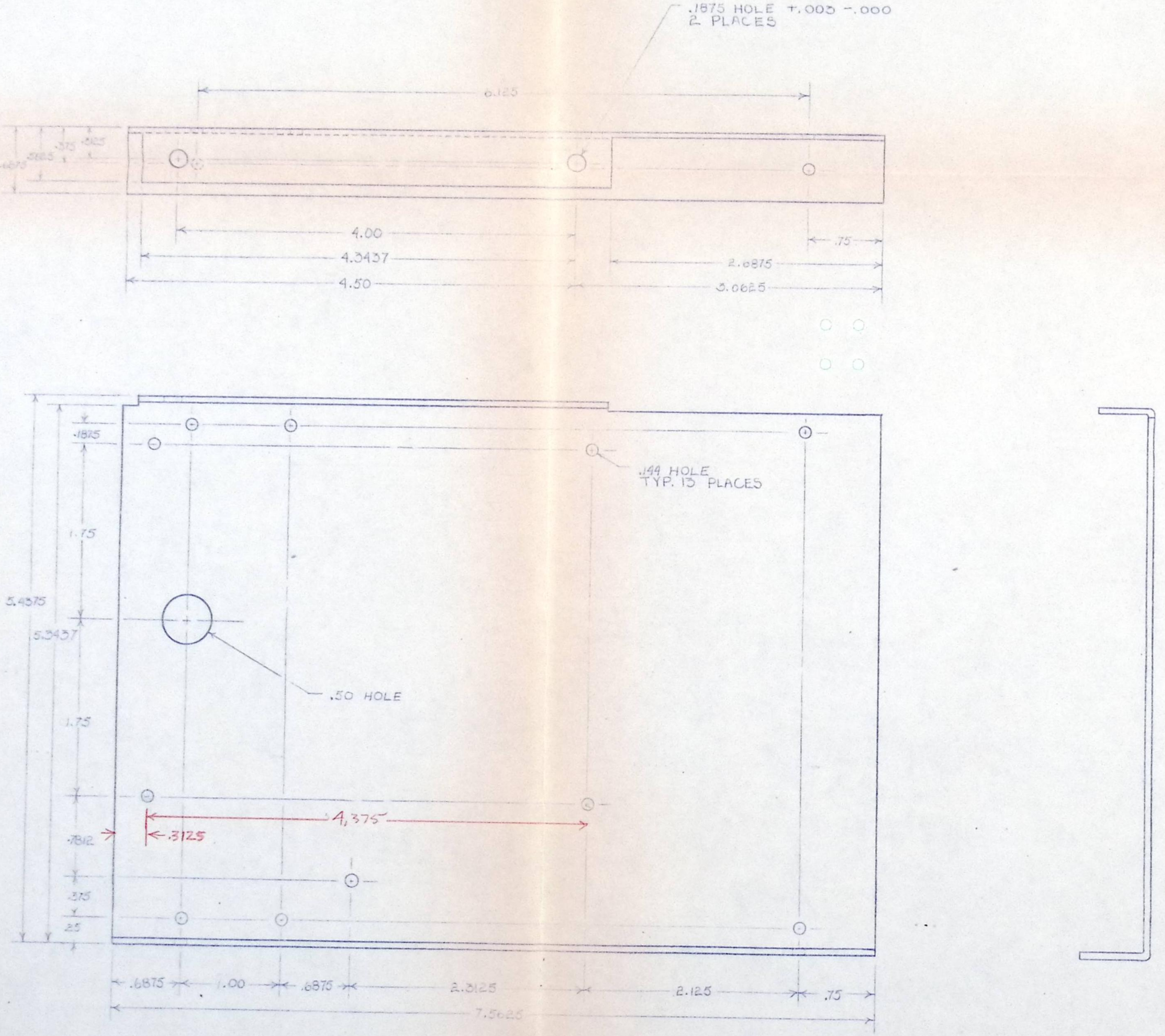
2475 W. 2nd AVE.
DENVER, COLORADO 80223

		REVISIONS	BY	DATE
SCALE FULL				
DATE 9-30-80				
DR'N GSH	CKD			
AP'VD				

TITLE OVERLAP CAMERA CONTROL NEST LEFT SIDE

NO CI-00320

1 OF 2



COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE.
DENVER, COLORADO 80223

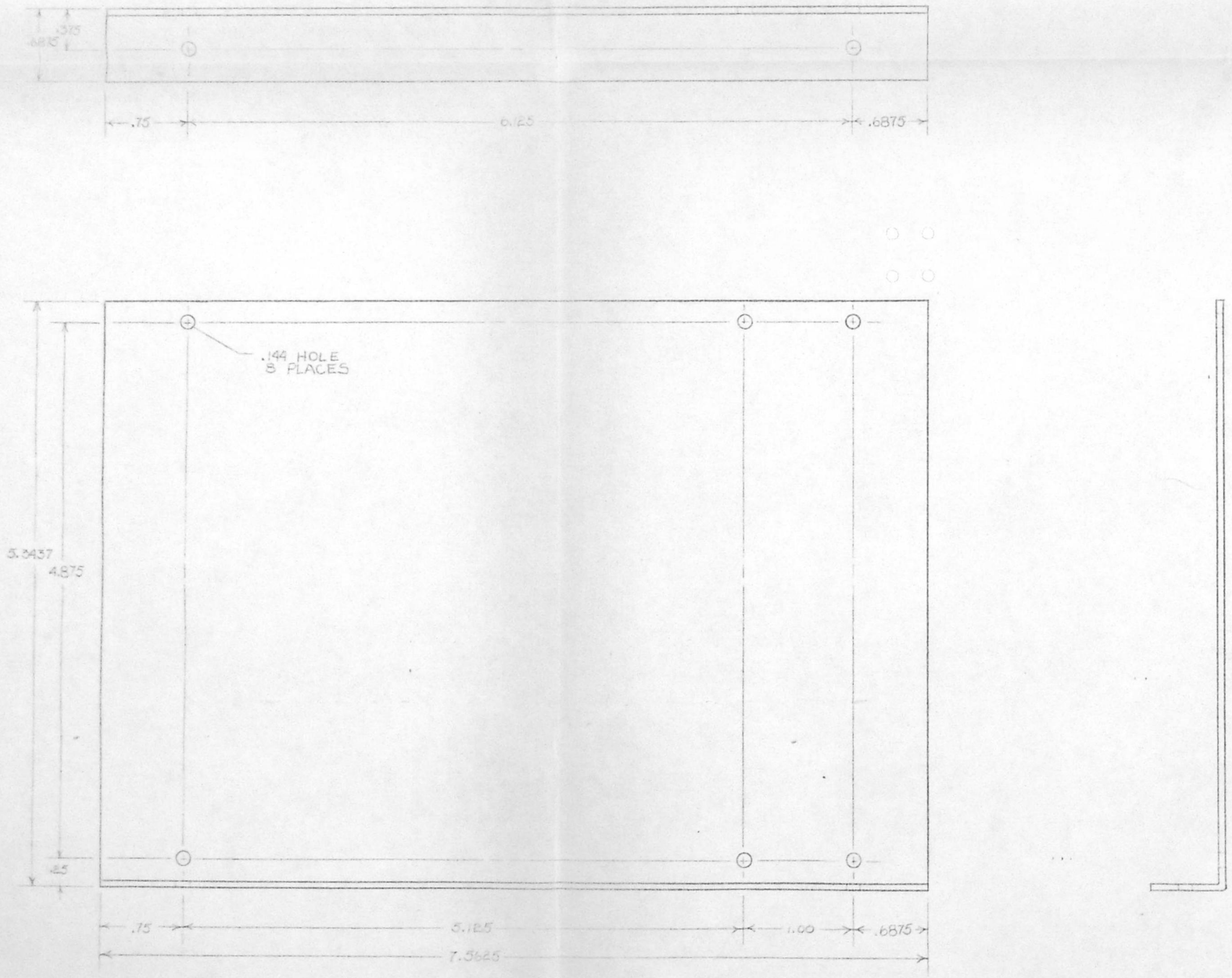
TOLERANCE		
FRACT.	±	1/32
.XX	±	.015
.XXX	±	.005

SCALE FULL
DATE 9-30-80
DR'N GSH
CKD
AP'VD

REVISIONS	BY	DATE

TITLE OVERLAP CAMERA CONTROL
NEST LEFT SIDE

NO CI-00320
~~CI-00316~~
1 OF 2



COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE.
DENVER, COLORADO 80223

TOLERANCE		
FRACT.	±	1/32
.XX	±	.015
.XXX	±	.005

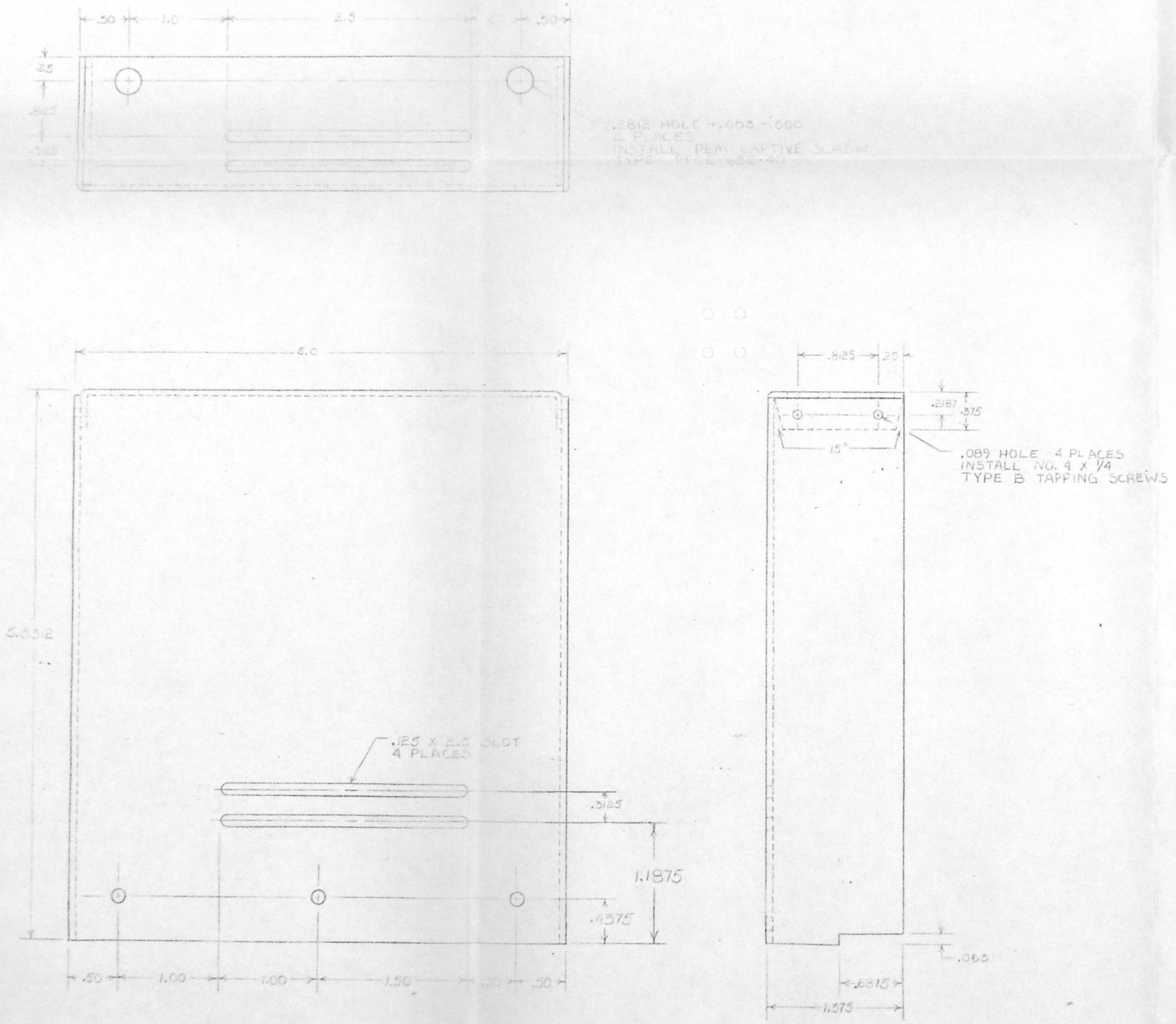
SCALE FULL
DATE 10-1-80
DR'N GSH
CKD
AP'VD

REVISIONS	BY	DATE

TITLE OVERLAP CAMERA CONTROL NEST RIGHT SIDE

NO CI-00320

2 OF 2



COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE.
DENVER, COLORADO 80223

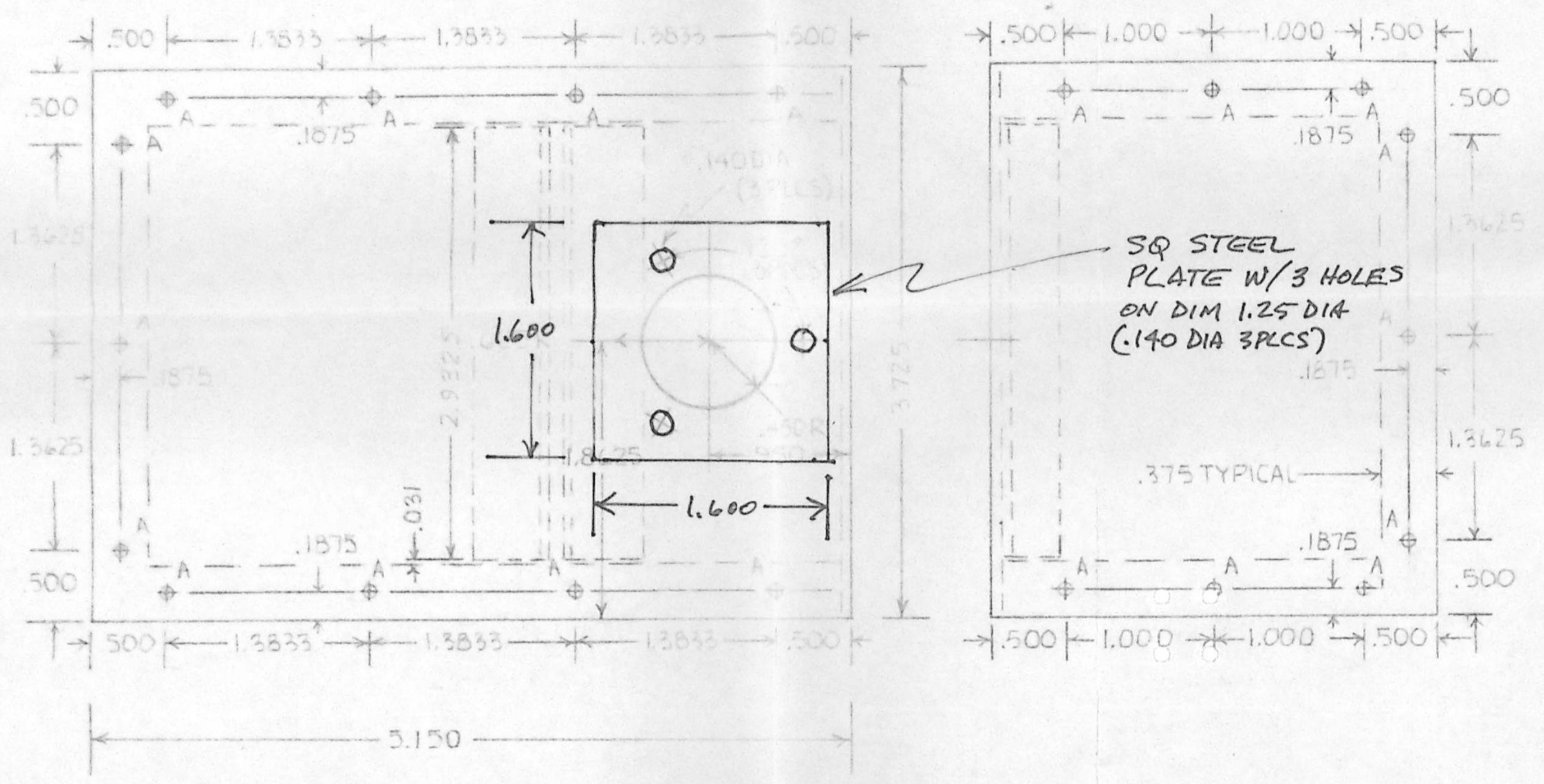
SCALE FULL
DATE 9-30-80
DR'N GSH
CKD
AP'VD

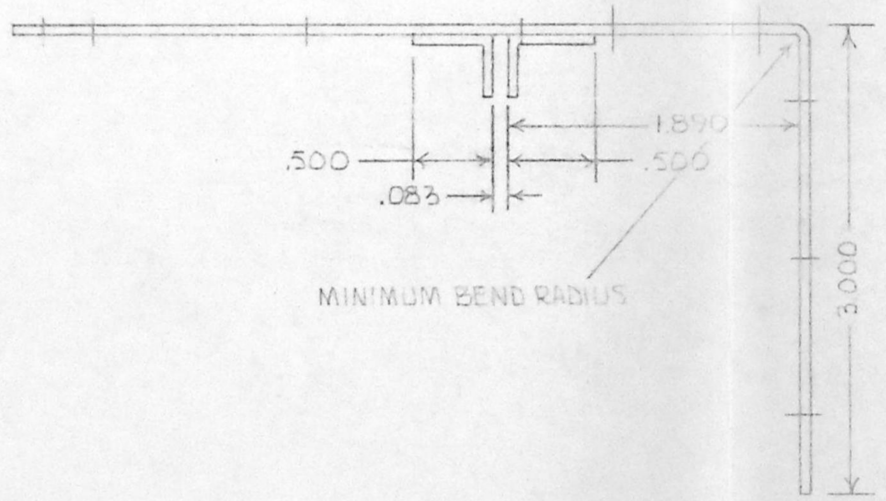
REVISIONS	BY	DATE
	GSH	1-22-8

TOLERANCE	
FRACT.	± 1/32
.XX	± .015
.XXX	± .005

TITLE
OVERLAP CAMERA
H.V. SUPPLY COVER

NO
CI-00321



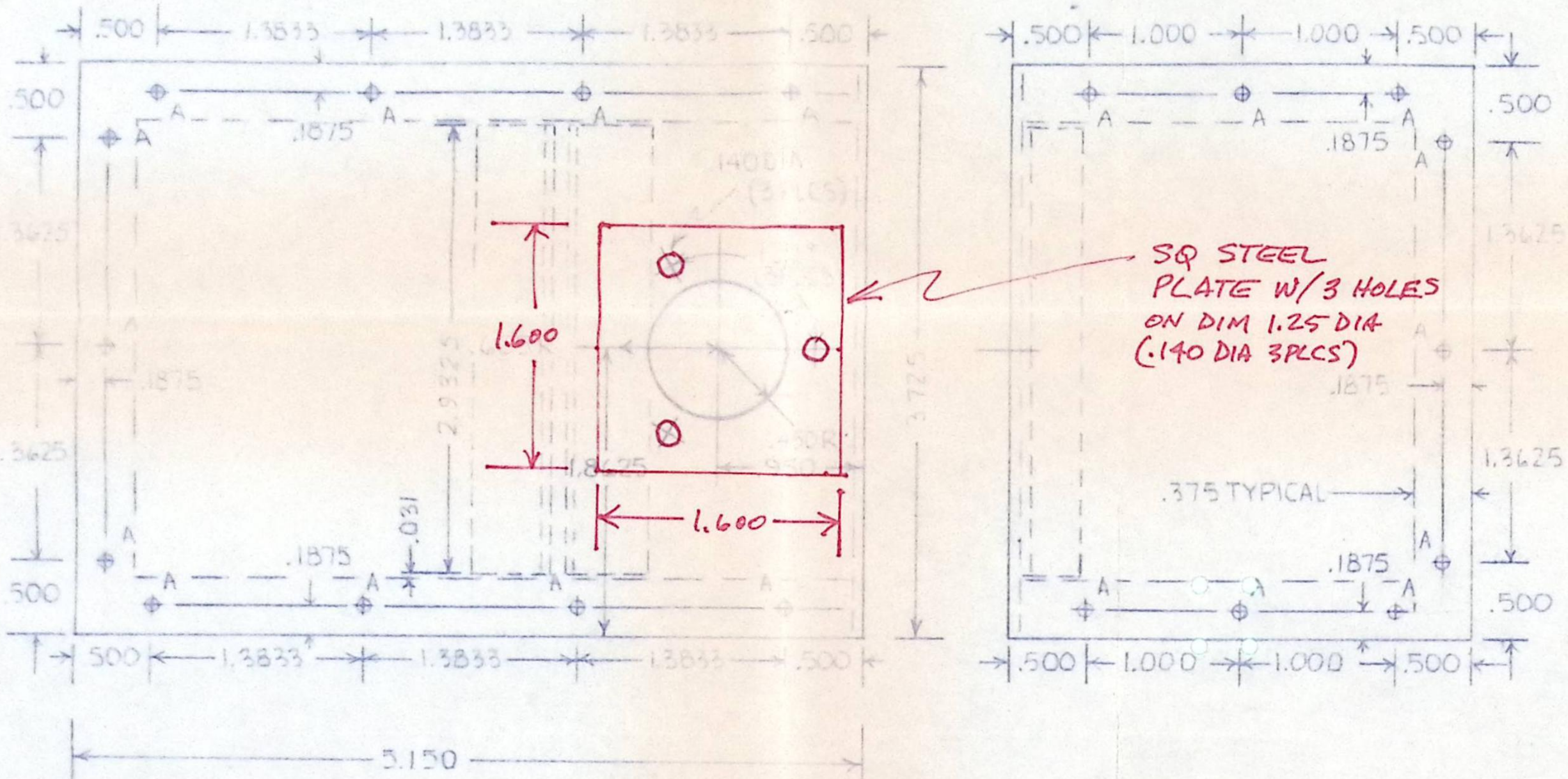


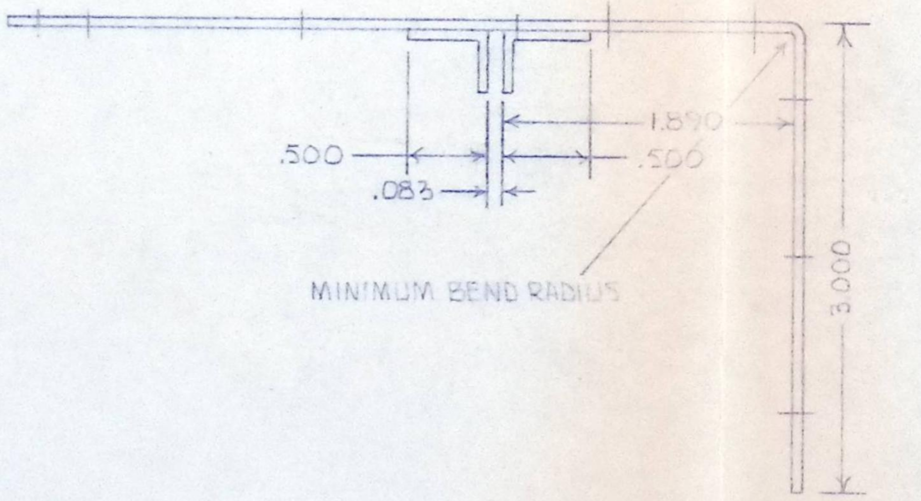
MATL - ATSM A366 CRS X.0598THK (16Ga).
FINISH - CHROMATE CONVERSION - BLACK (ZINC)

HOLE SIZE - A - .089DIA (20 PLACES)

TOP / END COVER
STROBE HOUSING ASSY
CAMERA DRAWER.

CI-00256 REV A
SH 1 OF 2

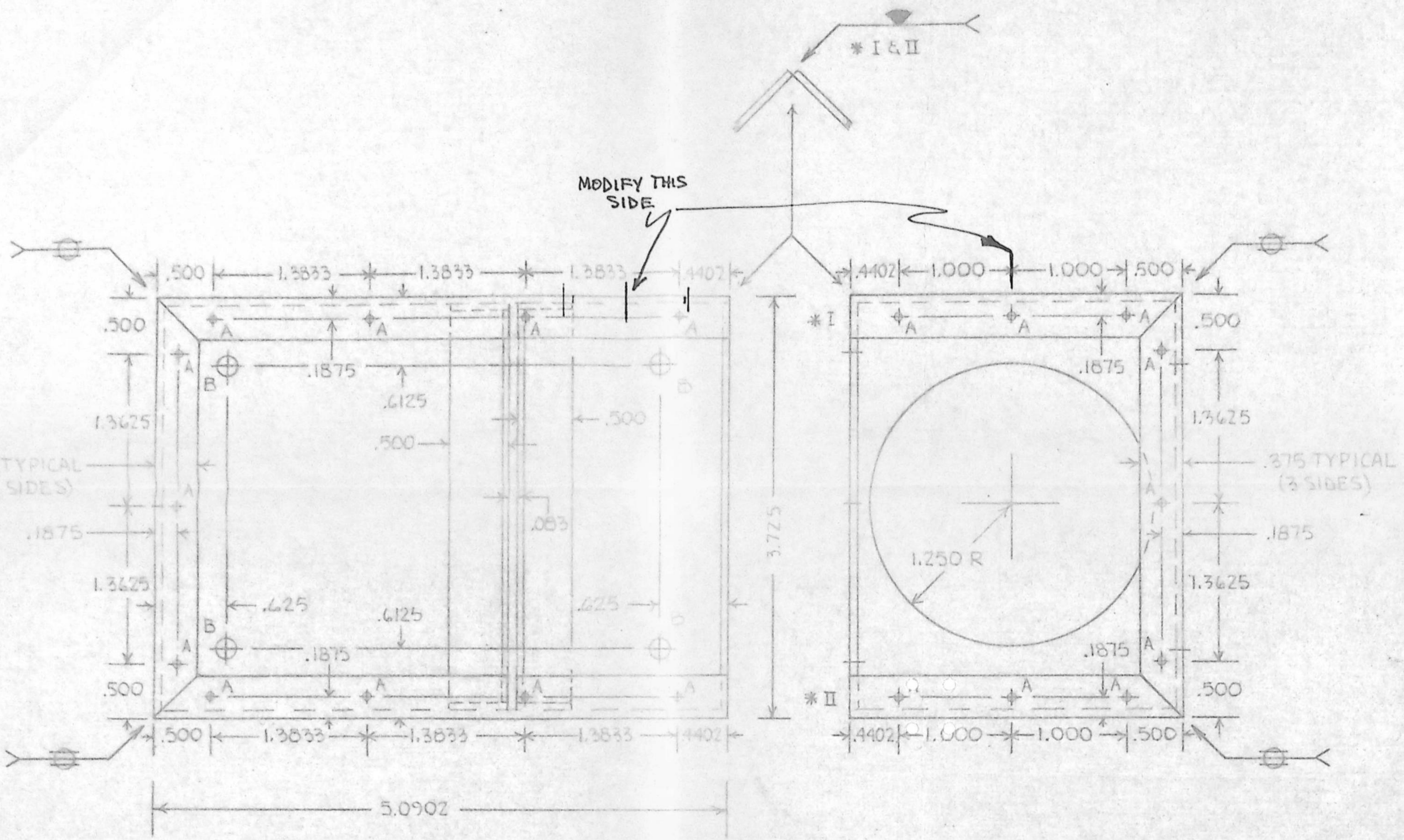


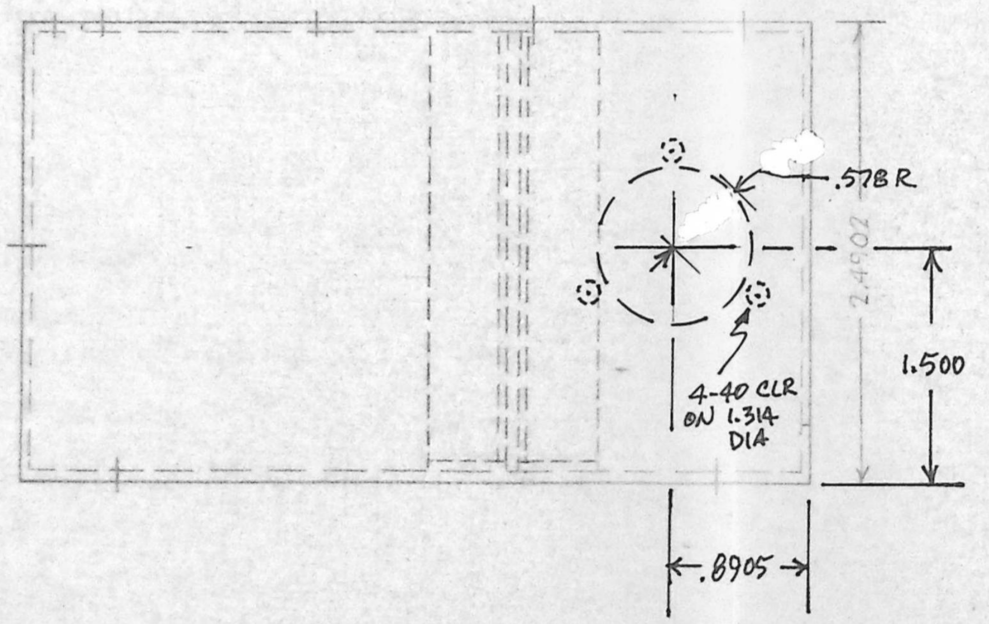


MATL - ATSM A366 CRS X.0598THK (16Ga).
FINISH - CHROMATE CONVERSION - BLACK (ZINC)

HOLE SIZE - A - .089DIA (20 PLACES)

TOP / END COVER
STROBE HOUSING ASSY
CAMERA DRAWER.
CI-00256 REV A
SH 1 OF 2



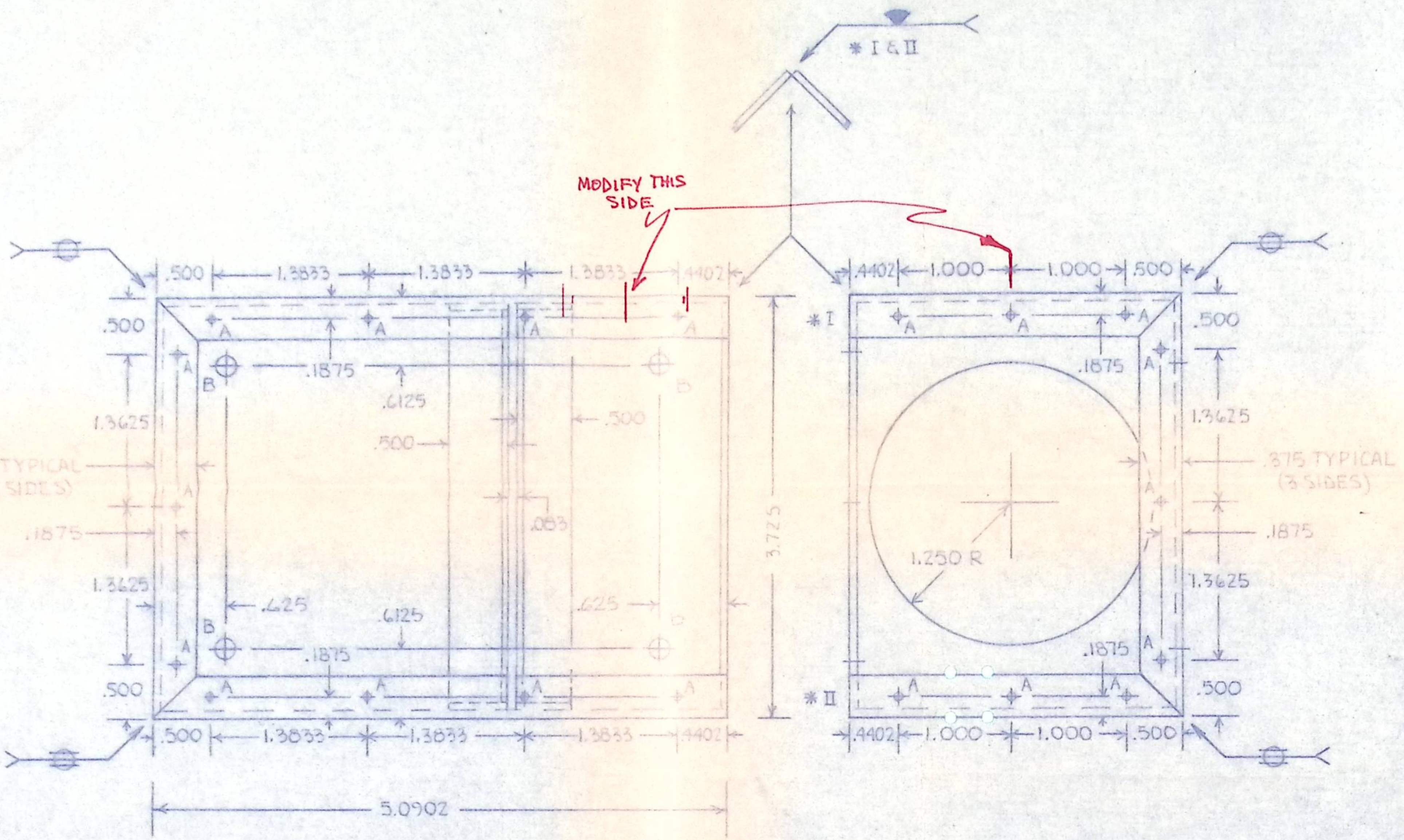


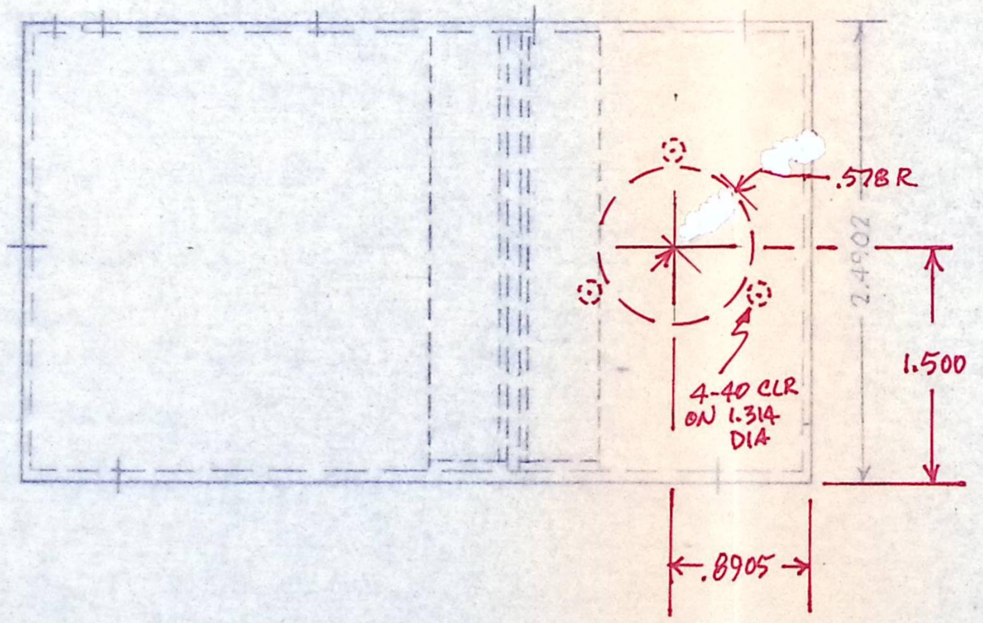
MATL - ATSM A366 CRS X.0598 THK (16Ga)
FINISH ~ CHROMATE CONVERSION - BLACK (ZINC)

HOLE SIZE - A - 2-56 UNC, THRU THD. (20 PLCS)
B - .1875 DIA - INSTALL 6-32 PEM NUT, CARBON STEEL, S-632-2 (PEM) (4 PLACES)

END/SIDE/BOTTOM
STROBE HOUSING ASSY
CAMERA DRAWER

CI-00256 REV A
SH 2 OF 2



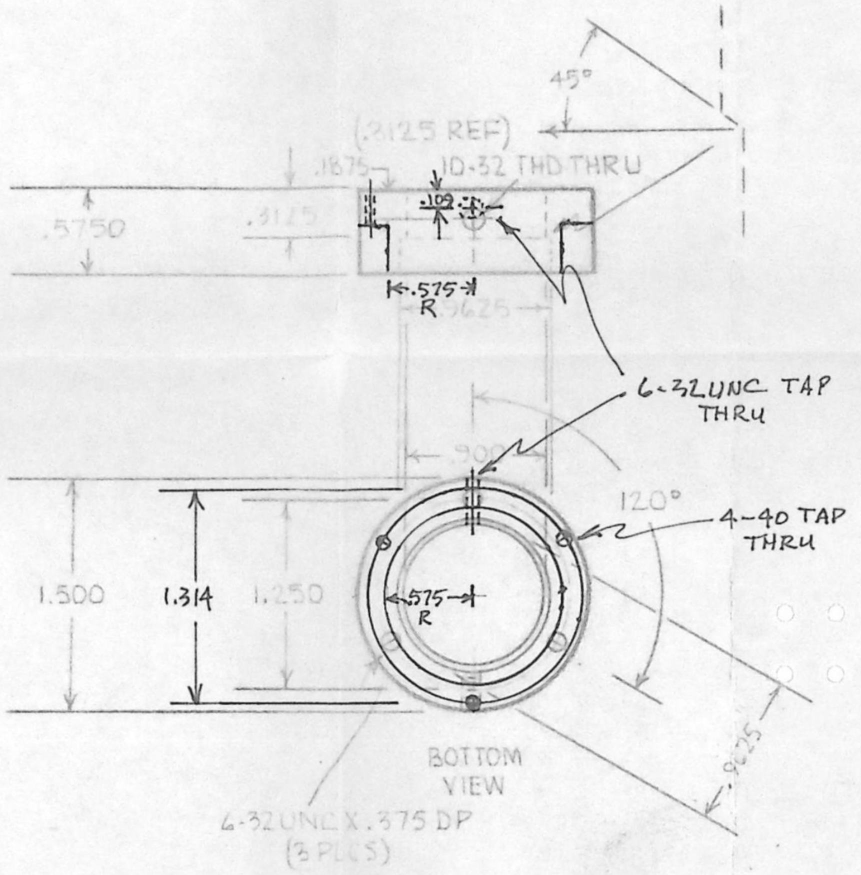


MATL - ATSM A366 CRS X.0598 THK (16Ga)
FINISH - CHROMATE CONVERSION - BLACK (ZINC)

HOLE SIZE - A - 2-56 UNC, THRU THD. (20 PLCS)
B - .1875 DIA - INSTALL 4-32 PEM NUT,
CARBON STEEL, S-632-2 (PEM)
(4 PLACES)

END/SIDE/BOTTOM
STROBE HOUSING ASSY
CAMERA DRAWER

C1-00256 REV A
SH 2 OF 2

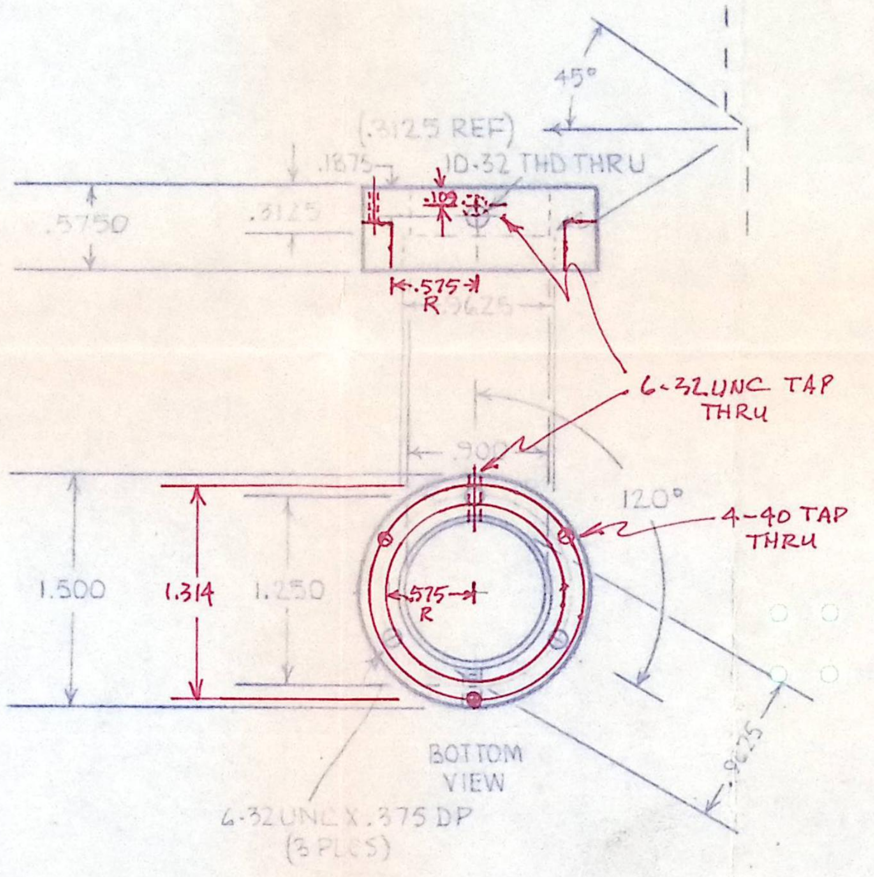


MATL - 1018 COLD FINISHED ROUND STK X 1.500 DIA
FINISH - ZINC CHROMATE - BLACK

7/29/81

SUPPORT RING, STROBE
CAMERA DRAWER
SCAN CONVERTER

CI-00251 REV A

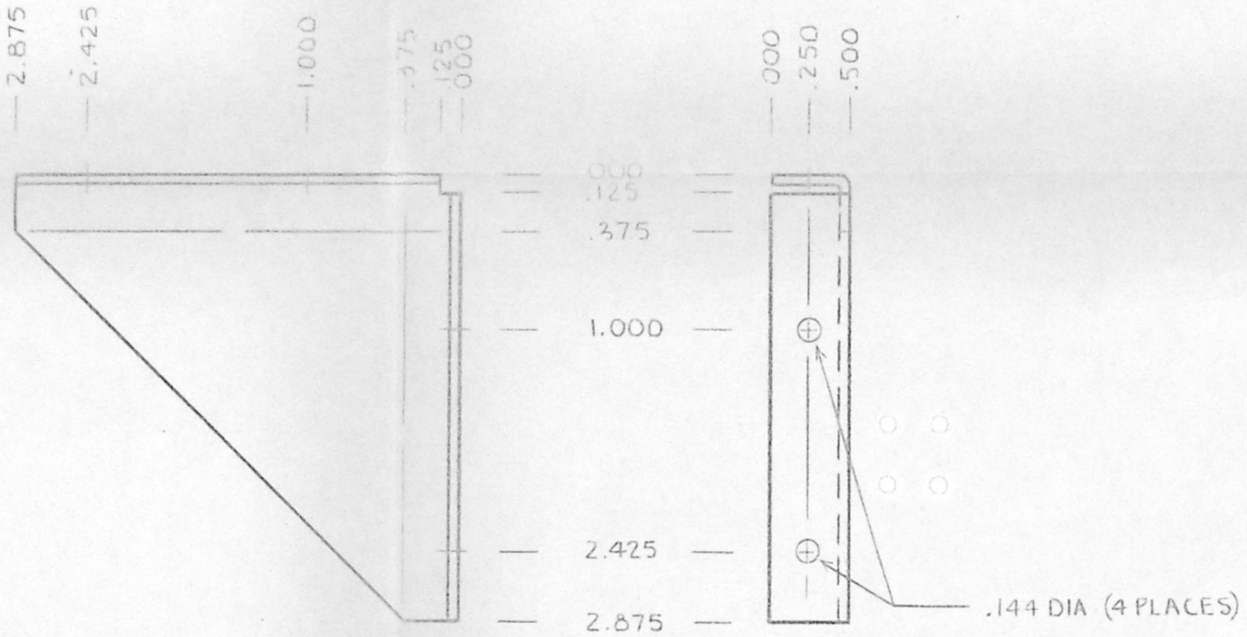


MATL - 1018 COLD FINISHED ROUND STK X 1.500 DIA
FINISH - ZINC CHROMATE - BLACK

7/29/81

SUPPORT RING, STROBE
CAMERA DRAWER
SCAN CONVERTER

CI-00251 REV A



TOP VIEW AND SIDE VIEW ARE IDENTICAL
MATERIAL - 5052 - H32 ALUMINUM , .063 THK
FINISH - CLEAR ANODIZE

COMPUTER
IMAGE
CORPORATION

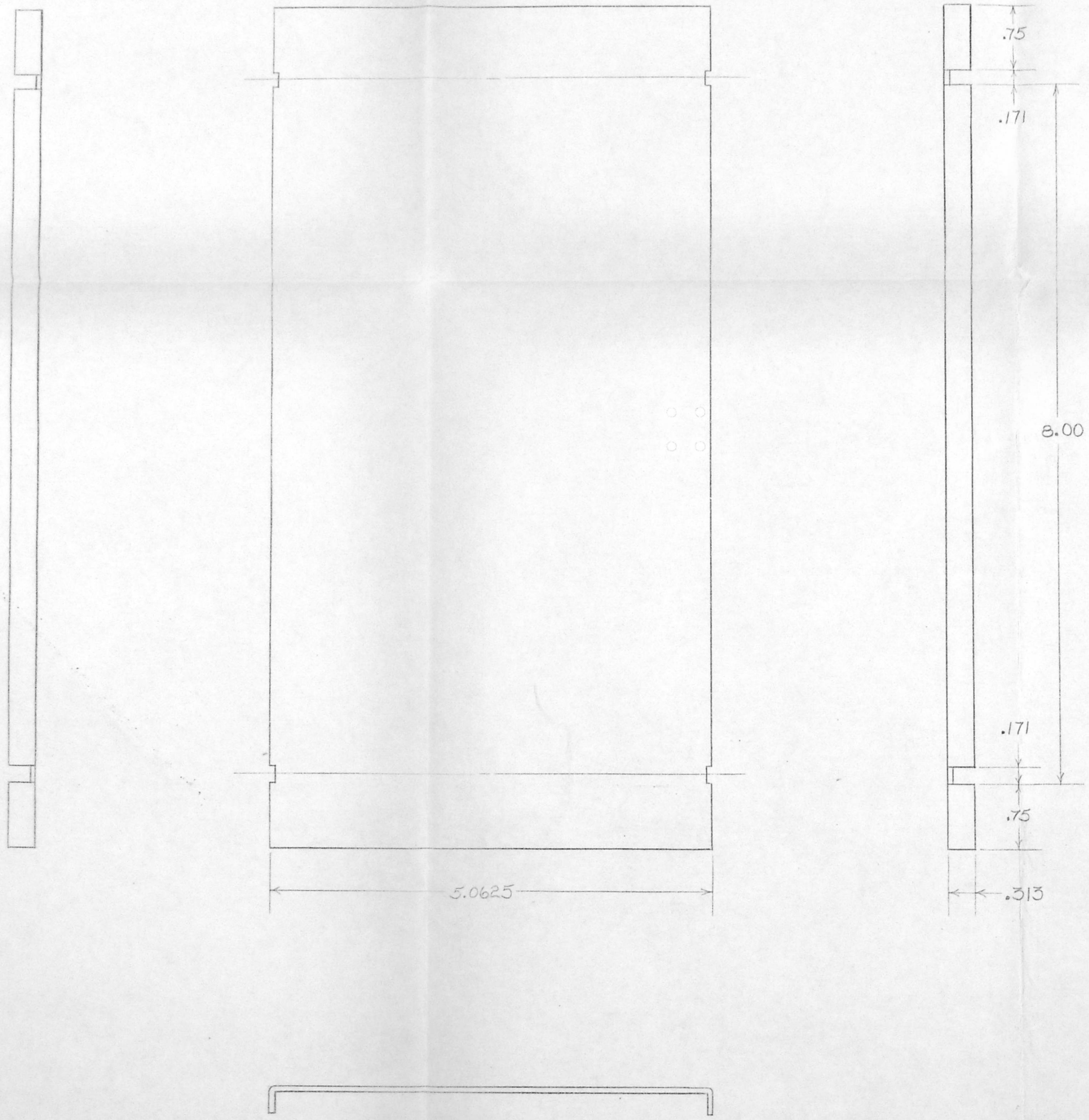
2475 W. 2nd AVE.
DENVER, COLORADO 80223

TOLERANCE	
FRACT	± 1/32
XX	± .015
XXX	± .005

		REVISIONS	BY	DATE
SCALE 1 X 1				
DATE 3/2/81				
DR'N EVL	CKD			
AP'VD				

TITLE SC MONITOR DRAWER FRONT/REAR PANEL
SUPPORT BRACKET

NO CI-00322.



MATERIAL: 6061-T6 ALUM.
FINISH: ANODIZE CLEAR

COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE.
DENVER, COLORADO 80223

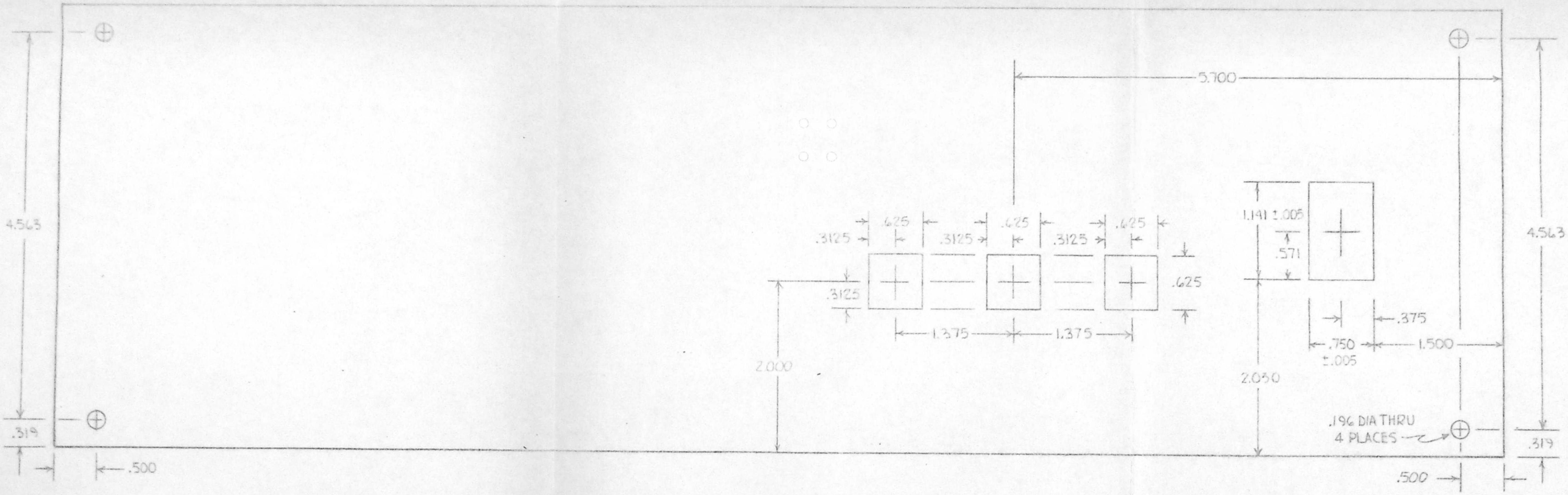
SCALE FULL
DATE 1-22-81
DR'N GSH
CKD
AP'VD

REVISIONS	BY	DATE

TOLERANCE		
FRACT.	±	1/32
.XX	±	.015
.XXX	±	.005

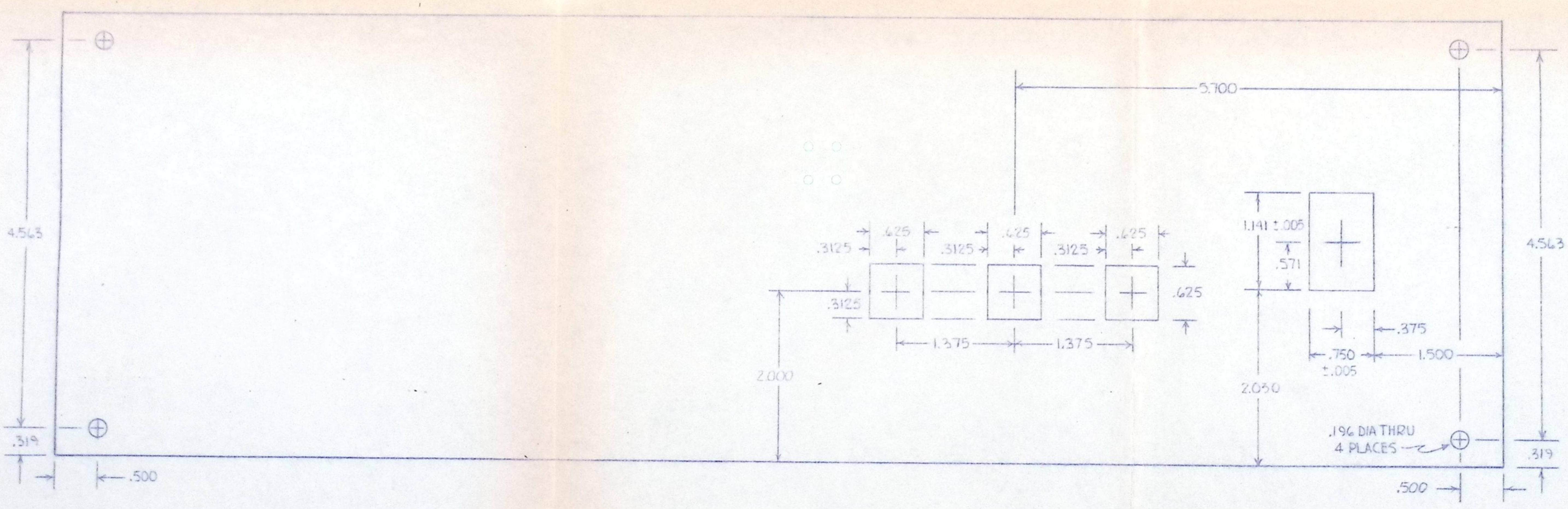
TITLE SCANCONVETER ALIGNMENT JIG

NO CI-00324



FRONT PANEL
±48VDC POWER SUPPLY (SOLA)

CI-00334



FRONT PANEL
±48VDC POWER SUPPLY (SOLA)

CI-00334

Inputs to Monitor Video Processor

4/1/81

1. From Scan Converter Power Supply

± 15 volts

± 5 volts — 6 wires, molex connector

Grd

2. From Control Panel

A. Threshold slide pots, analog sig out

8 thresholds

1 reference voltage

9 twisted pairs, all returns connected at both ends

9

B. Rotary Switches

Select Levels Cam A ; 1 pole, 5 pos ; } → 5 wires

Select levels Cam B ; 1 pole, 5 pos ; } [illegible] wires

Level Display ; 1 pole, 6 pos ; — 6 wires — 16

CAM SELECT — 2 wires

C. Toggle Switches

Test / Norm — 1 wire

Non Inv / Inv — 1 wire

System Normal / Maintenance — 1 wire — 3

D. Rotary Pot

Overlap Adjust — 3 wires — 3

~~31~~ twisted pairs

29

Inputs to Monitor Video Processor (cont)

3. From RPU#2

A. Digital Controls, twisted pair

Camera Select	8
Overlap on/off	1
Section Overlap on/off	1
Axis locate	1
Monitor Blkg	1
Horiz Sync	1
Vert Sync	1
	14 twisted pair

B. Video Signals, coax with BNC

Overlay Int. Comp In	1
X Deflection Sig In	1
Y Deflection Sig In	1
Autosectioning Video Out	1
X-Hatch Sig In	1
	5

4. From Color Decoder, Video Signals, coax with BNC Optional

.RED	2
.BLUE	2
.GREEN	2
.LUM	2
	8

5. From Camera Controls, Video Signals, coax with BNC

.CAM A	1
.CAM B	1
.CAM_AUX 1	1
.CAM_AUX 2	1
	4

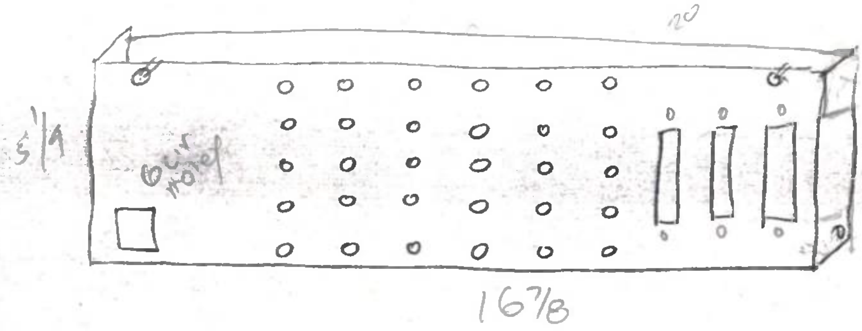
Inputs to Monitor Video Processor (cont)

6. From Scan Converter, Video Signals, Coax with BNCs

Overlap Write Video Out	1
X Overlap Read Video In	1
Overlap Intensity comp Out	1
Flash Pulse out to Overlap	1
Video Clamp to Overlap	1
X Deflection Out to Mon	1
Y Deflection Out to Mon	1
X Deflection out to Overlap	1
Y Deflection out to Overlap	1
Monitor Blkg Out	1
Monitor Video Out	1
	11
	5
	8
	4
	2[illegible]

Totals

		connectors
31	twisted pair to control panel	2
14	twisted pair to RPU #2	1
28	coax with BNCs	28
5	power leads from SC power supply	1
		32 connectors



Inputs to Color Controller

4/2/81

1. From Switcher/Color Controller Power Supply
   - ± 15
   - ± 5
   - Grd

2. From Control Panel
   - A. Threshold slide pots, analog sig out
     - 4 thresholds
     - 2 reference voltages
     - 6 — 6
   - B. Rotary Switches
     - Number of Active Color bands; 1 pole 4 pos — 4
   - C. Toggle Switches
     - Scan Bar Adjust/off/TV LOCK — 2
     - Key Normal/Invert — 1
     - Field 1/Normal/Field 2 — 2
   - D. Rotary Pots
     - Scan Bar Adjust — 2
     - Mix — 1

+5 volts out — 1

19

Inputs to Color Controller

3. From RPU

A. Controls, twisted pair

15 color levels	15
Red control (camera select) in	1
Blue control (camera select) in	1
Green control (camera select) in	1
Field 1/Normal/Field 2	2
	20

B. Video Signals, coax with BNCs

Variable Vertical Reset	1
TV Frame Pulse	1
	2

4. From Color Encoder coax with BNCs

Lumenance In	1
Lumenance Out	1
Red out	1
Blue out	1
Green out	1
	5

5. From Scan Convertor

Scan Converter Video In	1
Composite Camera Bldg out	1
	2

Inputs to Color Controller

6. External Sources , coax with BNCs

Composite Blkg In	2
Vertical Drive In	2
Horizontal Drive In	2
Key Video Out	2
	8

Totals

	connectors
19 twisted pair to control panel	1
20 twisted pair to RPU #1	1
17 coax with BNCs	17
5 power leads from power supply	1

Inputs to Video Switcher

4/2/91

1. From Switcher/Color Controller Power Supply
   - ± 15
   - ± 5
   - Grd

2. From Control Panel , twisted pair

A. Input controls	8
B. Toggle Switches	
A SYS IV / KEY / MIX	1
B SYS IV / MIX	0
C. Rotary pots	
KEY ADJUST	1
KEY GAIN	1
BACKGND MIX	1
XHATCH MIV	1
+5 volts	1
	14 twisted pair

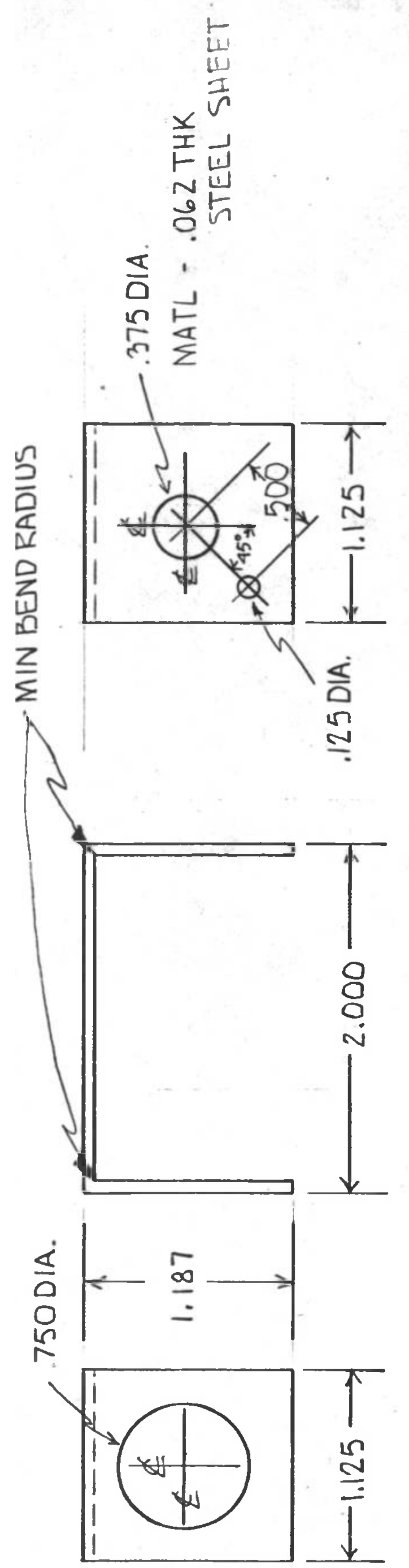
Inputs to Video Switcher (cont)

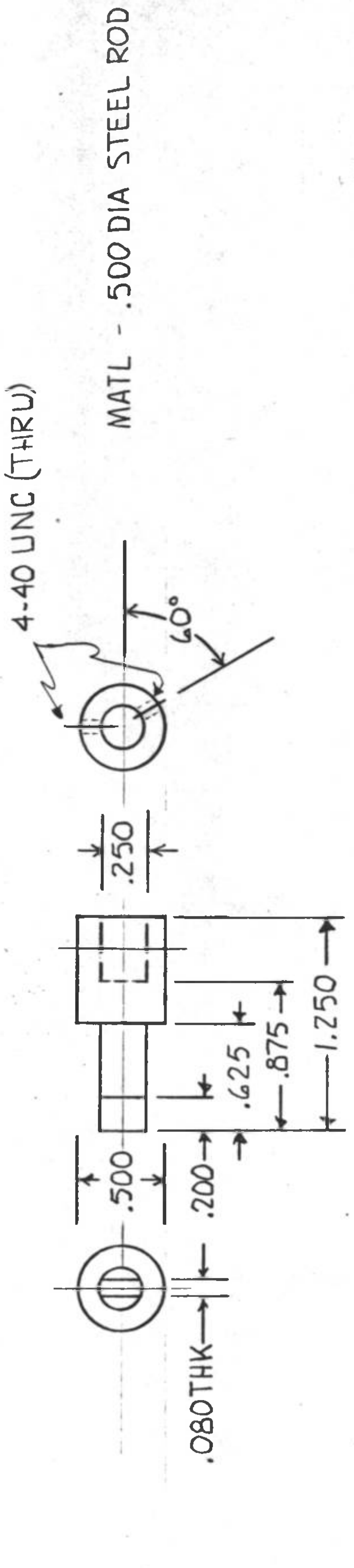
3. Video Signals, coax with BNCs

8 Video Inputs	16
Key Input	2
A Bus Out	1
B Bus Out	1
X Hatch Out	1
M/E 1 out	1
M/E 2 out	2
	24

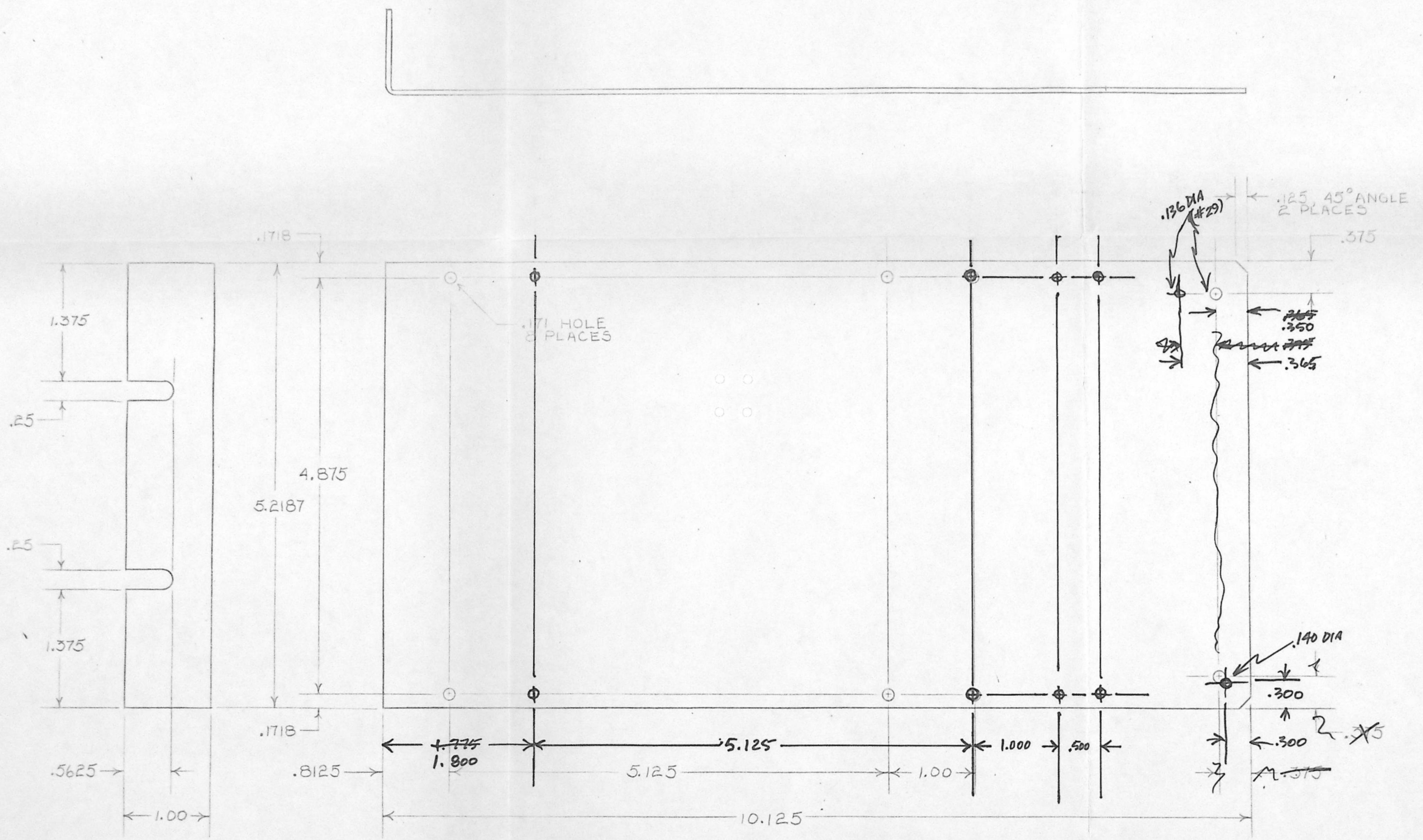
Totals

		connectors
14	twisted pair to control panel	1
24	coax with BNCs	24
5	power leads from VS/CC pwr supply	1
		26





SHAFT COUPLING SW BRACKET
SYSTEM SECURITY SWITCH
POWER LINE SWITCHING UNIT
CI-00367



NOTES
1. MATERIAL IS .090 THICK 5052-H32 OR USE SCANBE™ PART NUMBER 60051
2. FINISH IS CLEAR ANODIZE

COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE.
DENVER, COLORADO 80223

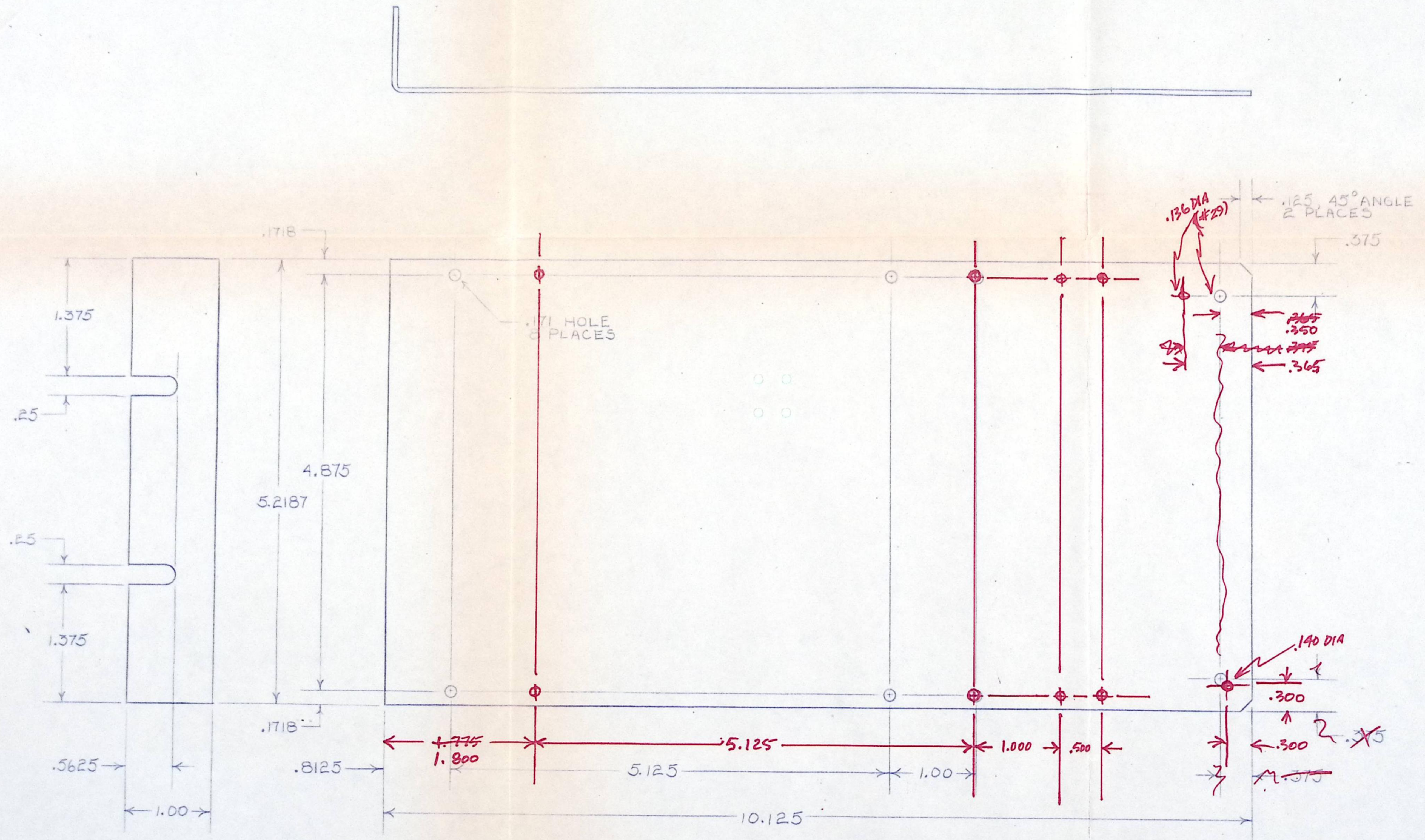
TOLERANCE		
FRACT	±	1/32
XX	±	.015
XXX	±	.005

SCALE FULL
DATE 2/14/81
DR'N GSH
CKD
AP'VD

REVISIONS	BY	DATE

TITLE CONTROL PANEL INTERFACE
5 1/4" NEST SIDE
RIGHT OR LEFT

NO CI-00339



NOTES:
1. MATERIAL IS .090 THICK 5052-H32 OR
USE SCANBE™ PART NUMBER 60051
2. FINISH IS CLEAR ANODIZE

COMPUTER
IMAGE
CORPORATION

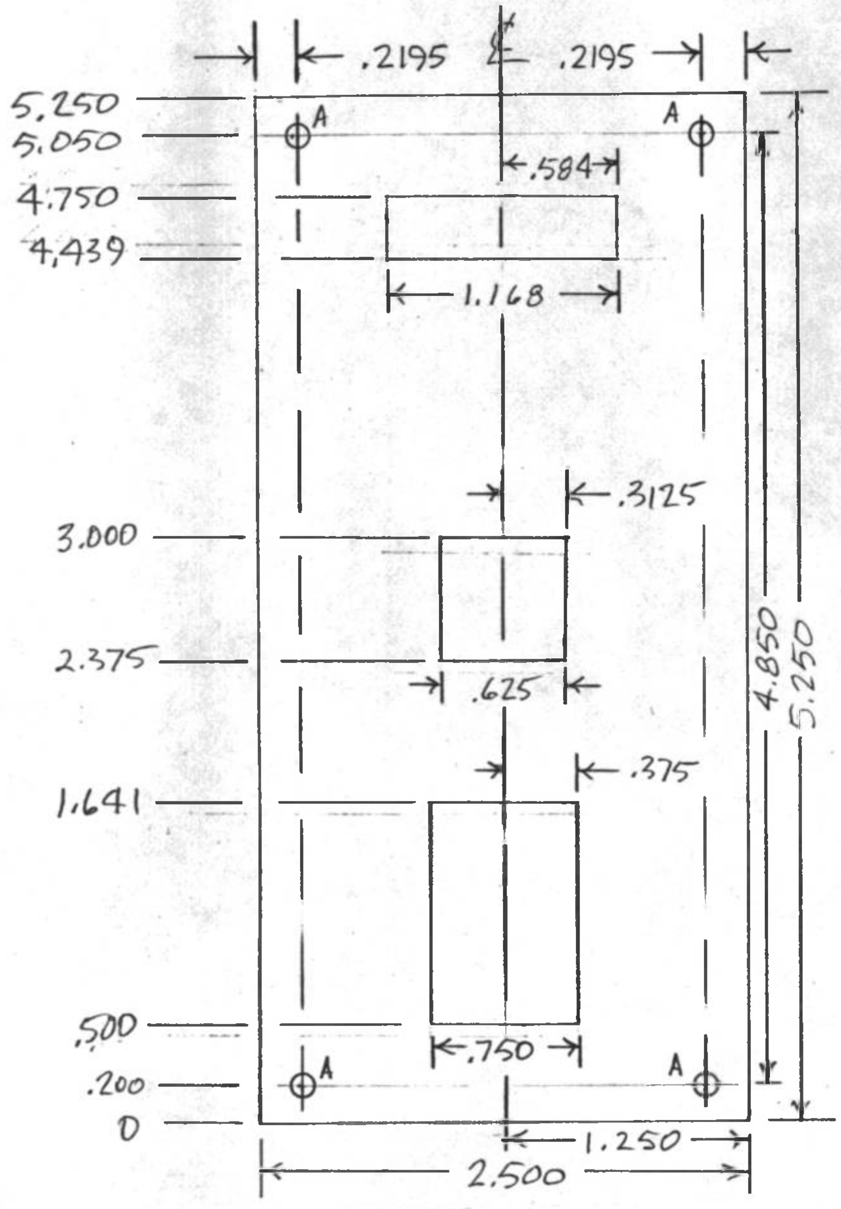
2475 W. 2nd AVE.
DENVER, COLORADO 80223

TOLERANCE		
FRACT	±	1/32
XX	±	.015
XXX	±	.005

	REVISIONS	BY	DATE
SCALE FULL			
DATE 2/14/81			
DR'N GSH / CKD			
AP'VD			

TITLE CONTROL PANEL INTERFACE
5 1/4" NEST SIDE
RIGHT OR LEFT

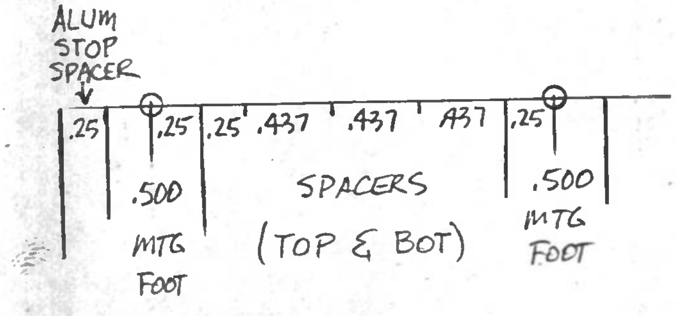
NO CI-00339



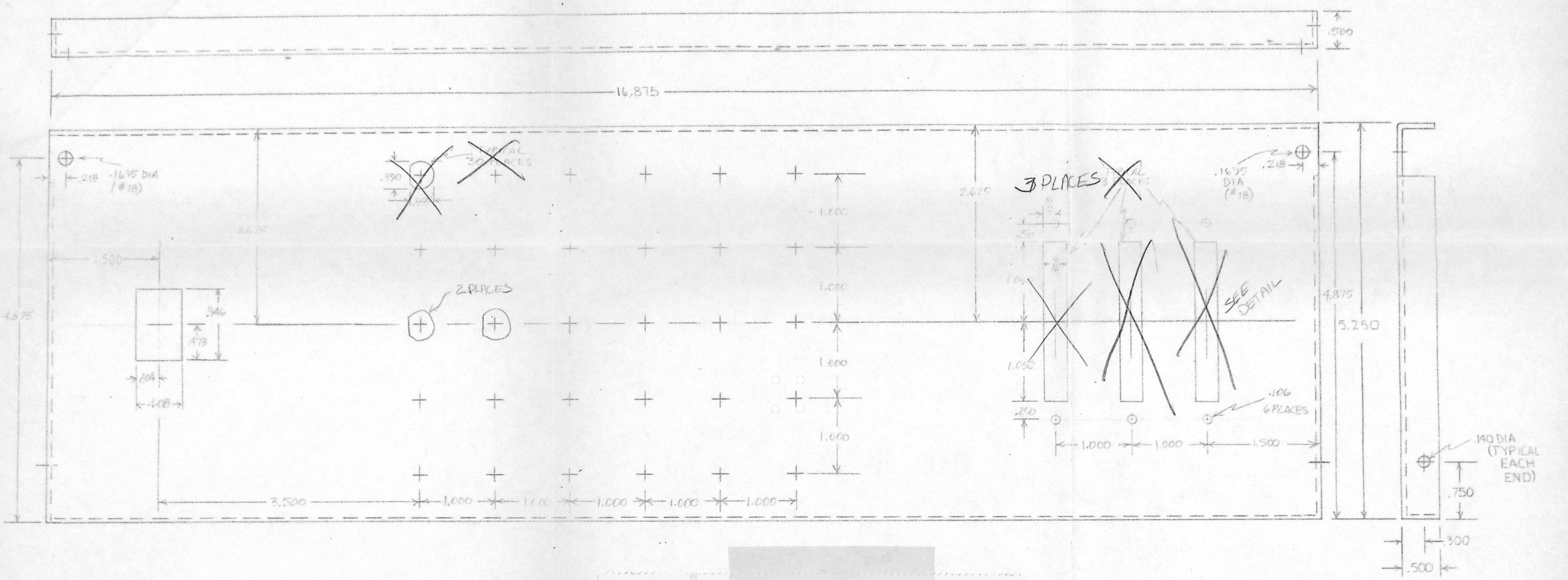
A .125 DIA. (4 PLACES)

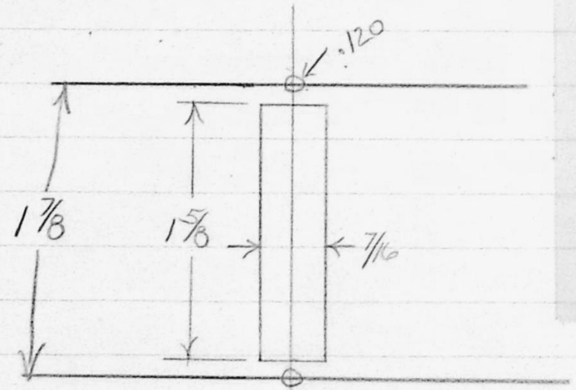
MATL - 5052-H32 X.063 ALUM

FINISH- BLACK ANODIZE



POWER PANEL
CONTROL PANEL INTERFACE
CI-00340



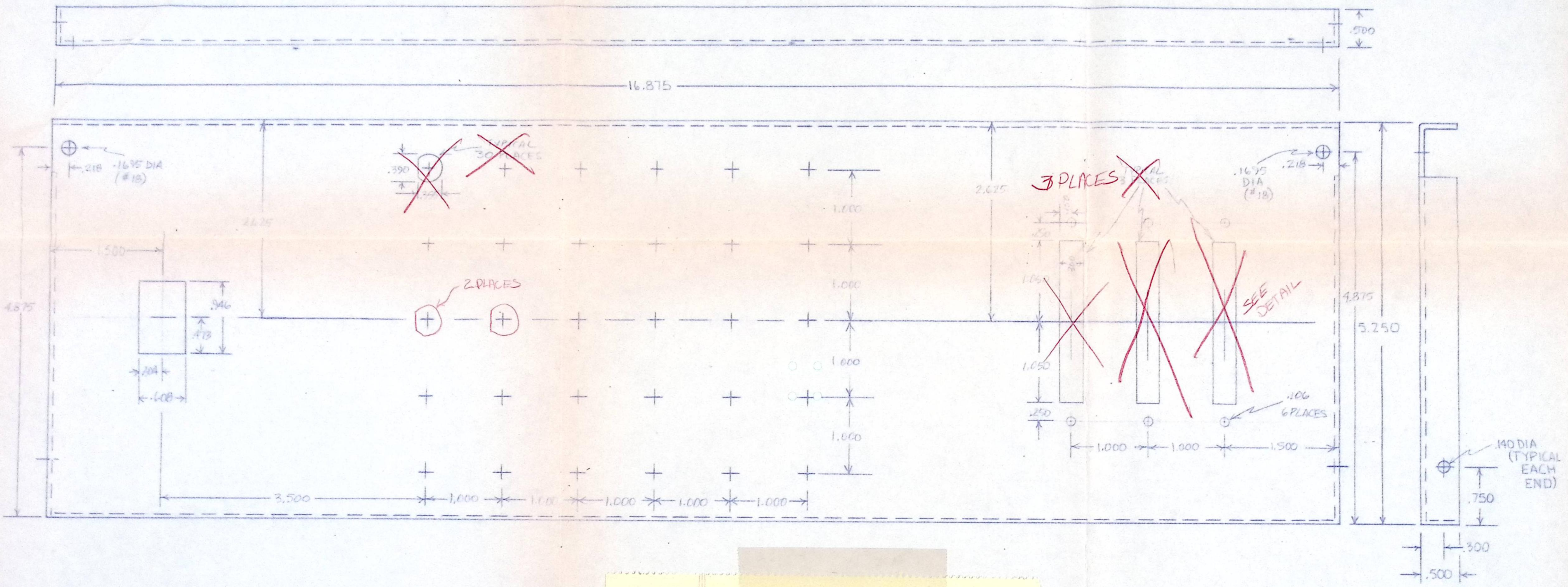


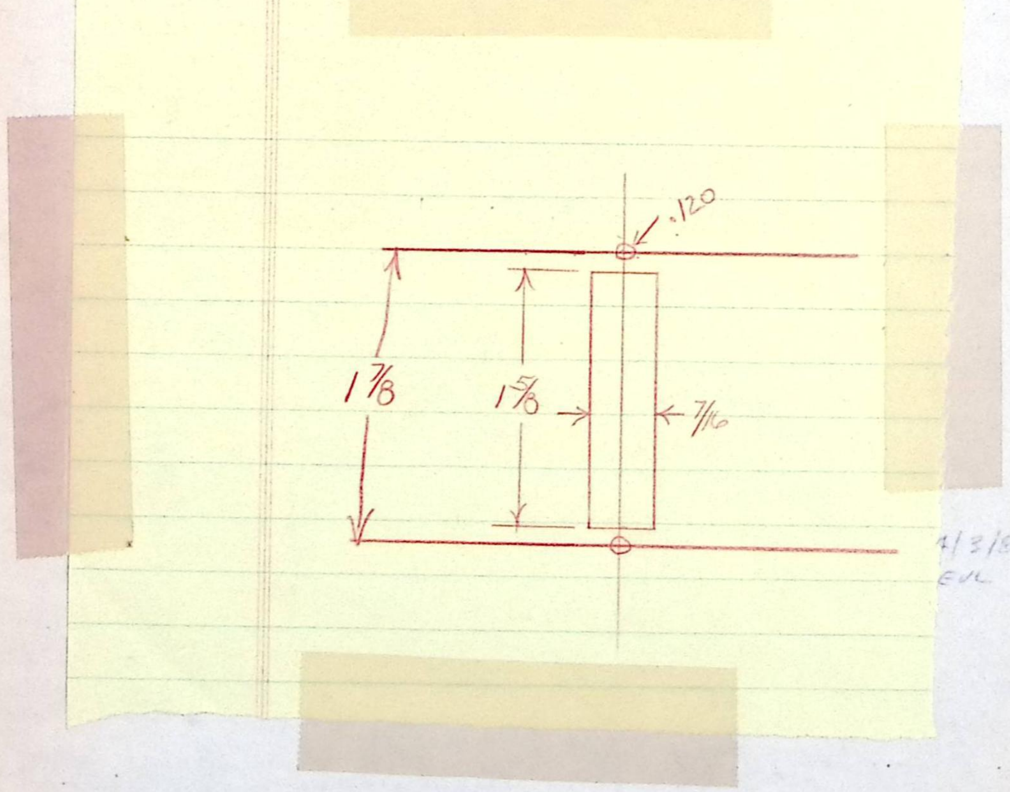
4/3/81
EVL

MATL - 5052-H32, .063 THK
FINISH - CLR ANODIZE

CONTROL PANEL NEST
~~UNIVERSAL~~ REAR PANEL

~~C1-00XXX~~
C1-00341





MATL - 5052-H32, .063 THK
FINISH - CLR ANODIZE

4/3/81
EVL

CONTROL PANEL NEST
~~UNIVERSAL~~ REAR PANEL

~~C1-00XXX~~
C1-00341

Inputs to RPU

top cover just for protection

all connectors on bottom panels

4/7/81

1. From Function Generator

±15	6 pin molex	
±5		
+12		
Analog Grd		
+5	welding cable	these are not on the back panel but on the card file
Digital Grd	welding cable	

2. From Function Generator

A. 50 wire cable with Control, Data + Address Buses

B. 10 analog signals coax with BNCs 10

3. From Monitor Video Processor

A. Digital Controls, twisted pair

Camera Select	8	
Overlap, on/off	1	
Section Overlap, on/off	1	
Axis Locate	1	
Monitor Blkg	1	
Horiz Sync	1	
Vert Sync	1	
	14	twisted pair

4. From Eclipse Computer

Data Bus on 25 twisted pair cable

2125

Inputs to RPU cont

5. From Monitor Video Processor, continued

B. Video Signals, coax with BNCs

Overlay Intensity Compensation out	1
X Deflection Signal out	1
Y Deflection Signal out	1
Auto Sectioning Video in	1
X Hatch Signal out	1
	5

6. From Color Controller

A. Controls, twisted pairs

15 color levels out	15
Red control (camera select) out	1
Blue control (camera select) out	1
Green control (camera select) out	1
Field 1/Normal/Field 2	2
	20

B. Video Signals, coax with BNCs

Variable Vertical Reset	1
TV Frame Pulse	1
	2

7. Other Video signals, coax with BNCs

A. Subcarrier	1

8. Control Panel Electronics twisted shielded pair 25 pin connector	1

Inputs to RPU cont

8. Camera Control #1 coax with BNC

Camera 1 Sync out 1

Camer 1 Blkg out $\frac{1}{2}$

9. Camera Control # 2 coax with BNC

Camera 2 Sync out 1

Camera 2 Blkg out $\frac{1}{2}$

10. Scan Converter coax with BNC

Intensity Compensation 1

11 AUX OUTPUTS coax with BNC 6

Totals

	connectors	
50 wire cable to Function Generator	1	
20 twisted pairs to Monitor Video Processor	1	
25 twisted pairs to Eclipse Computer	1	
20 twisted pairs to Color Controller	1	
~~23~~ 30 coax with BNCs	~~23~~ 29	
8 power leads from power supply	3	[one 6 pin + two studs]
1 twisted shielded pair to control panel electronics	1	

Inputs to Function Generator

4/7/81

1. From Main Power Supply

   ±15

   -5

   +12 /

   Analog Grd

   +5 /

   Digital Grd /

2. From RPU

   A. Power

      ±15

      -5 /

      +12

      Analog Grd

   B. 50 wire cable with Control, Data & Address Buses 1

   C. 10 analog signals, coax with BNCs 10

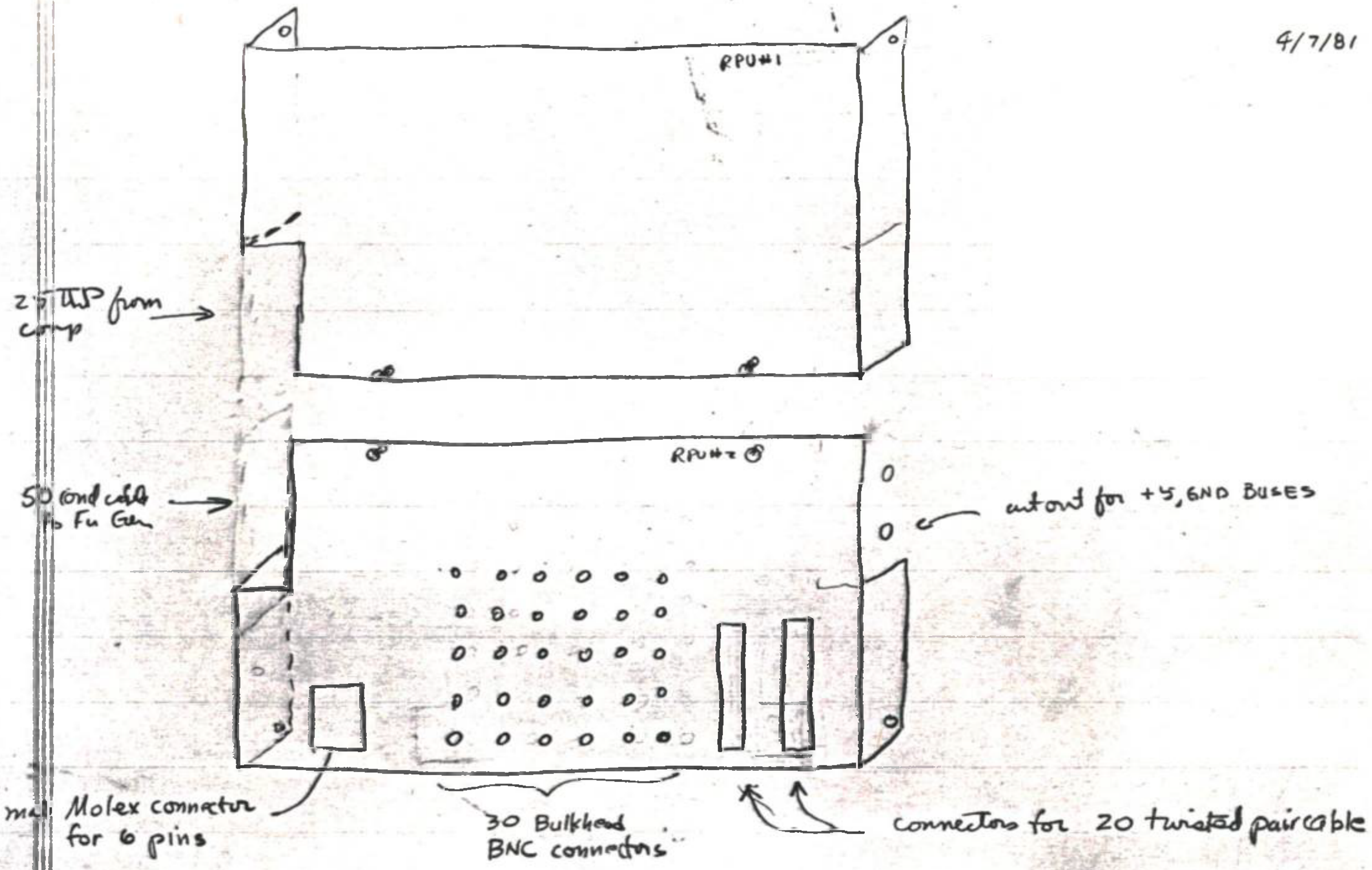
      outputs of Function Generation Combining circuits

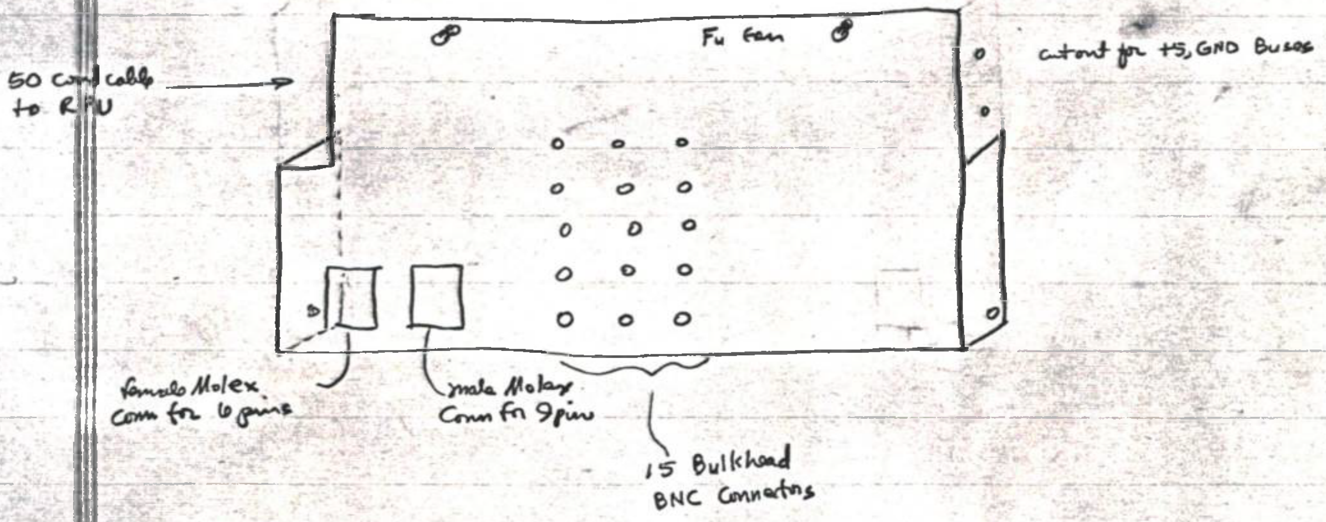
Totals

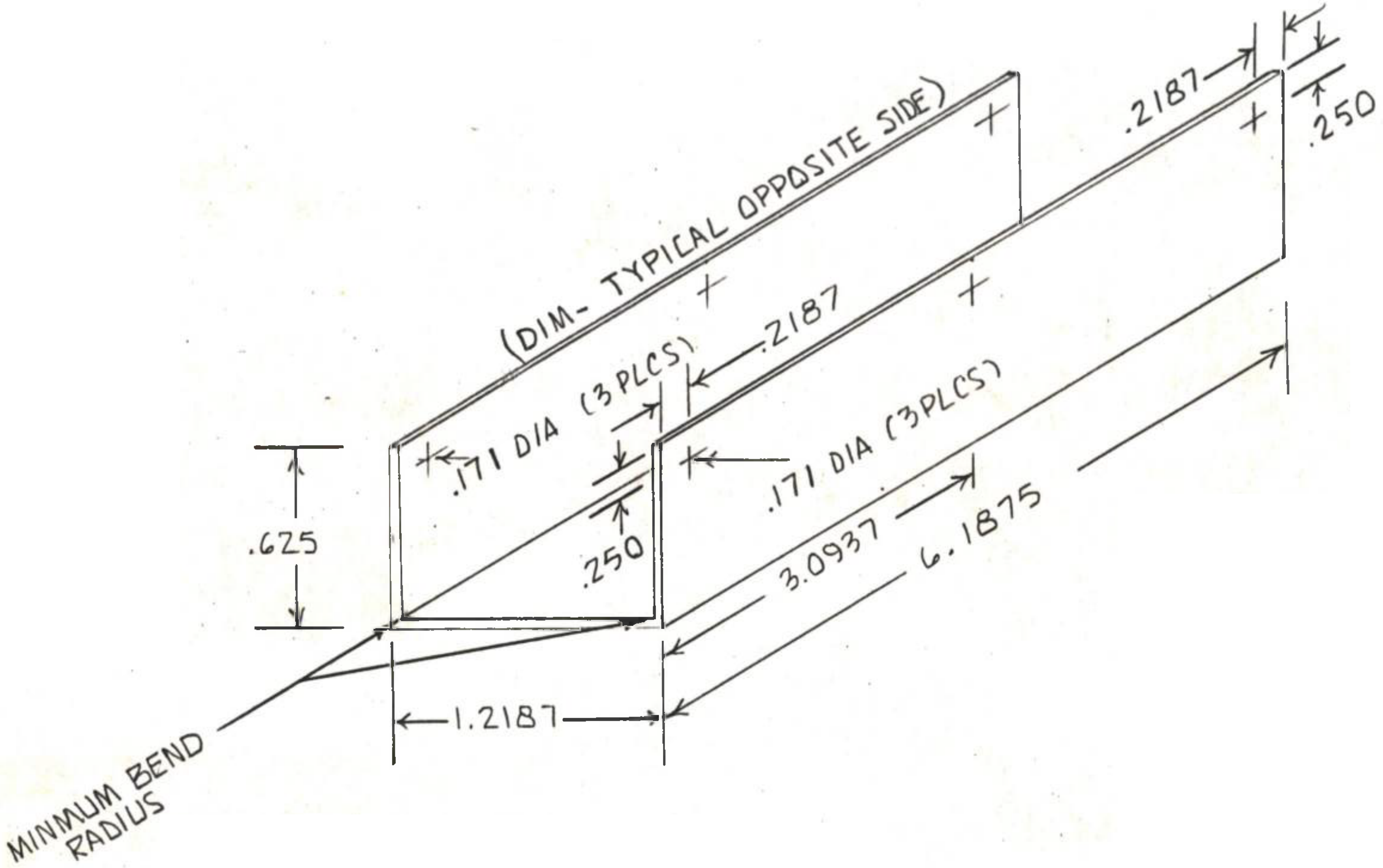
	connectors	
50 wire cable to RPU	1	
10 coax with BNCs	10	
17 power leads	4	[one 9 pin, one 6 pin & two studs]

Back Panel Design for RPU#1, RPU#2 & Function Generator

4/7/81


RPU#1
25 TWP from comp
RPU#2
50 cond cable to Fn Gen
cutout for +5, GND BUSES
male Molex connector for 6 pins
30 Bulkhead BNC connectors
connectors for 20 twisted pair cable

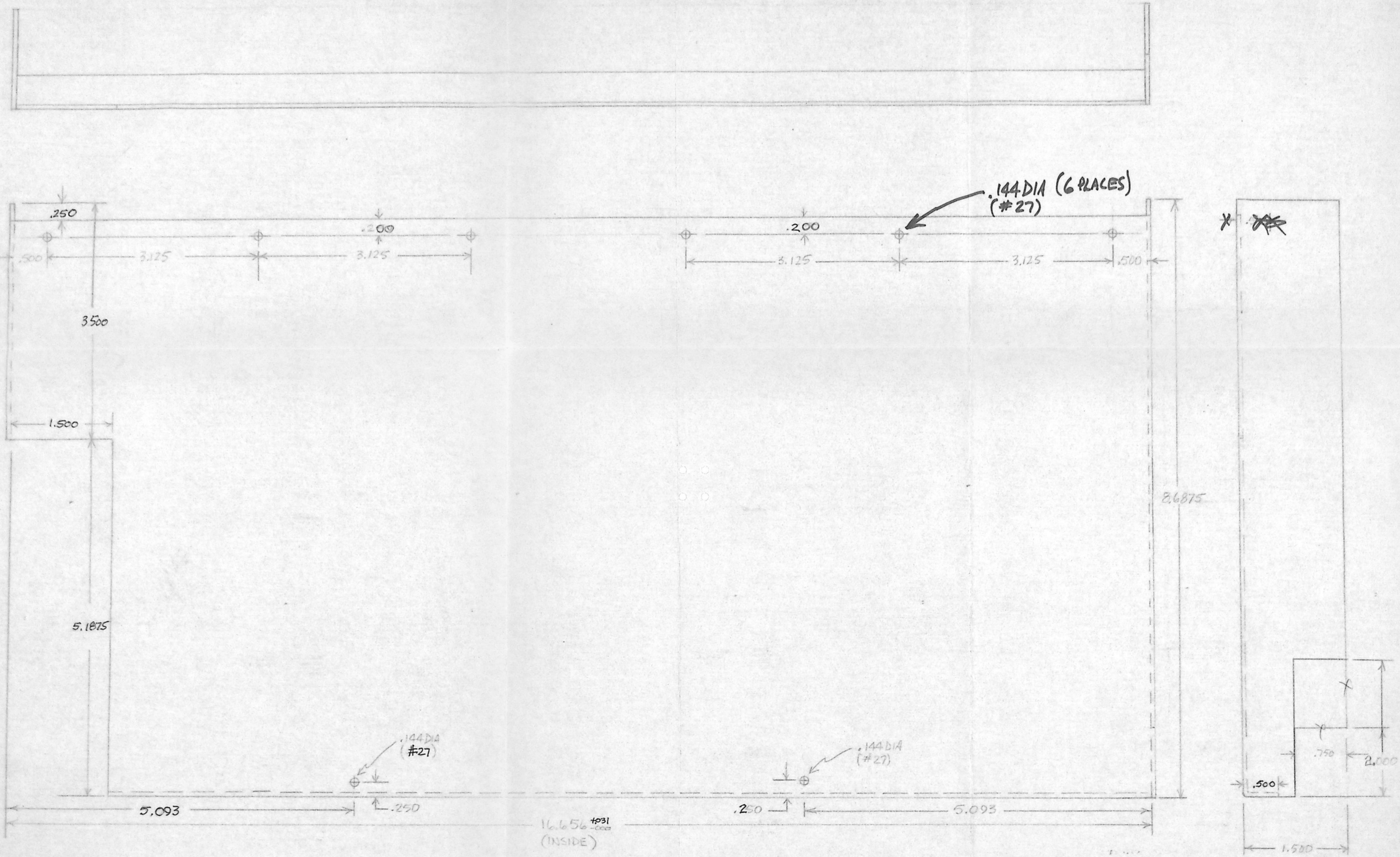

Fn Gen
50 cond cable to RPU
cutout for +5, GND Buses
female Molex Conn for 6 pins
male Molex Conn for 9 pins
15 Bulkhead BNC Connectors



MATL- ATSM A366 CRS X .0598 THK (16 Ga)

FINISH- ZINC CHROMATE -CLEAR

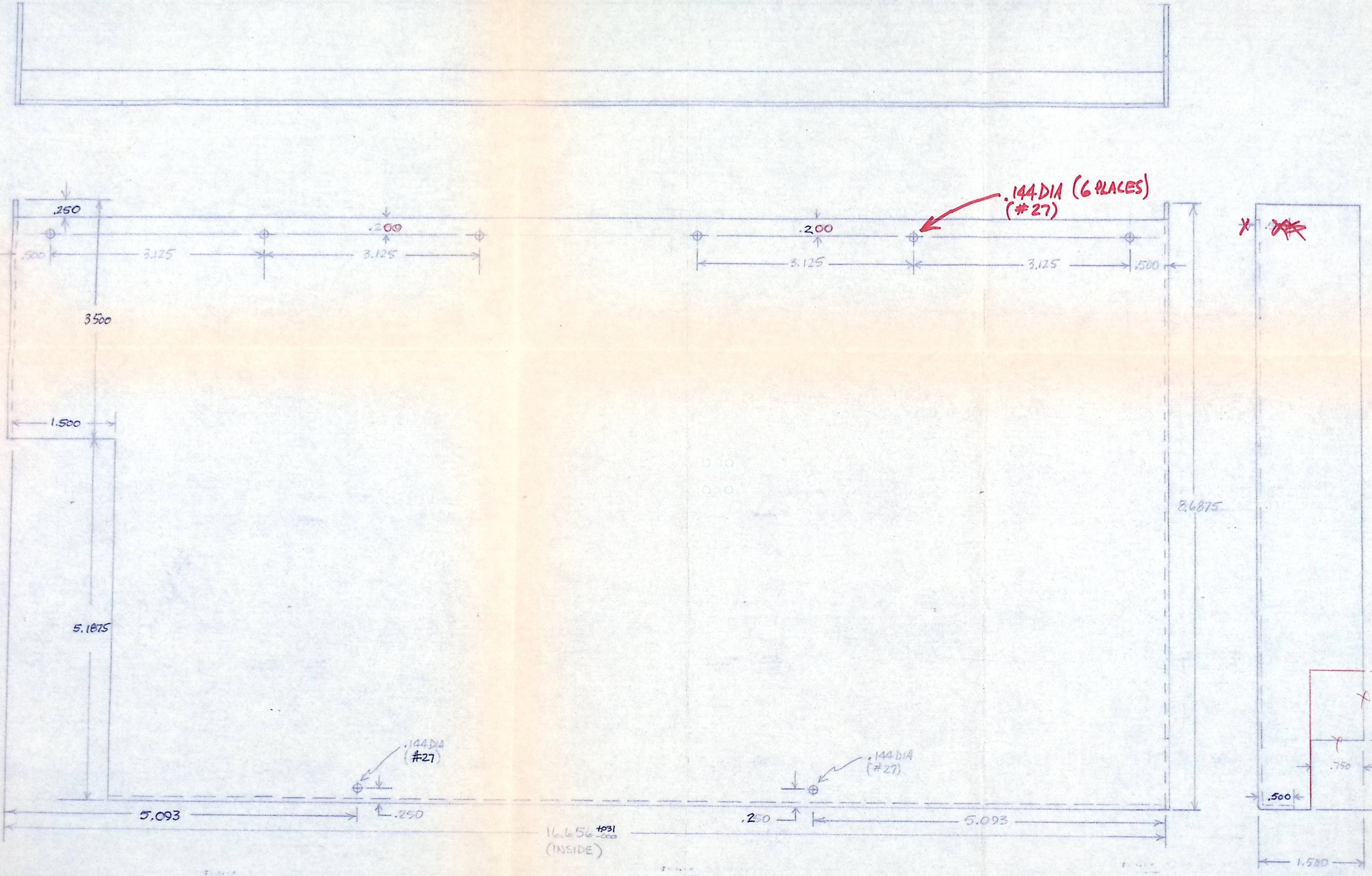
CARD RACK COUPLINC BRACKET



MATL — ATSM A 366 #16GA. (.0478) CRS

REAR PANEL, RPU #1

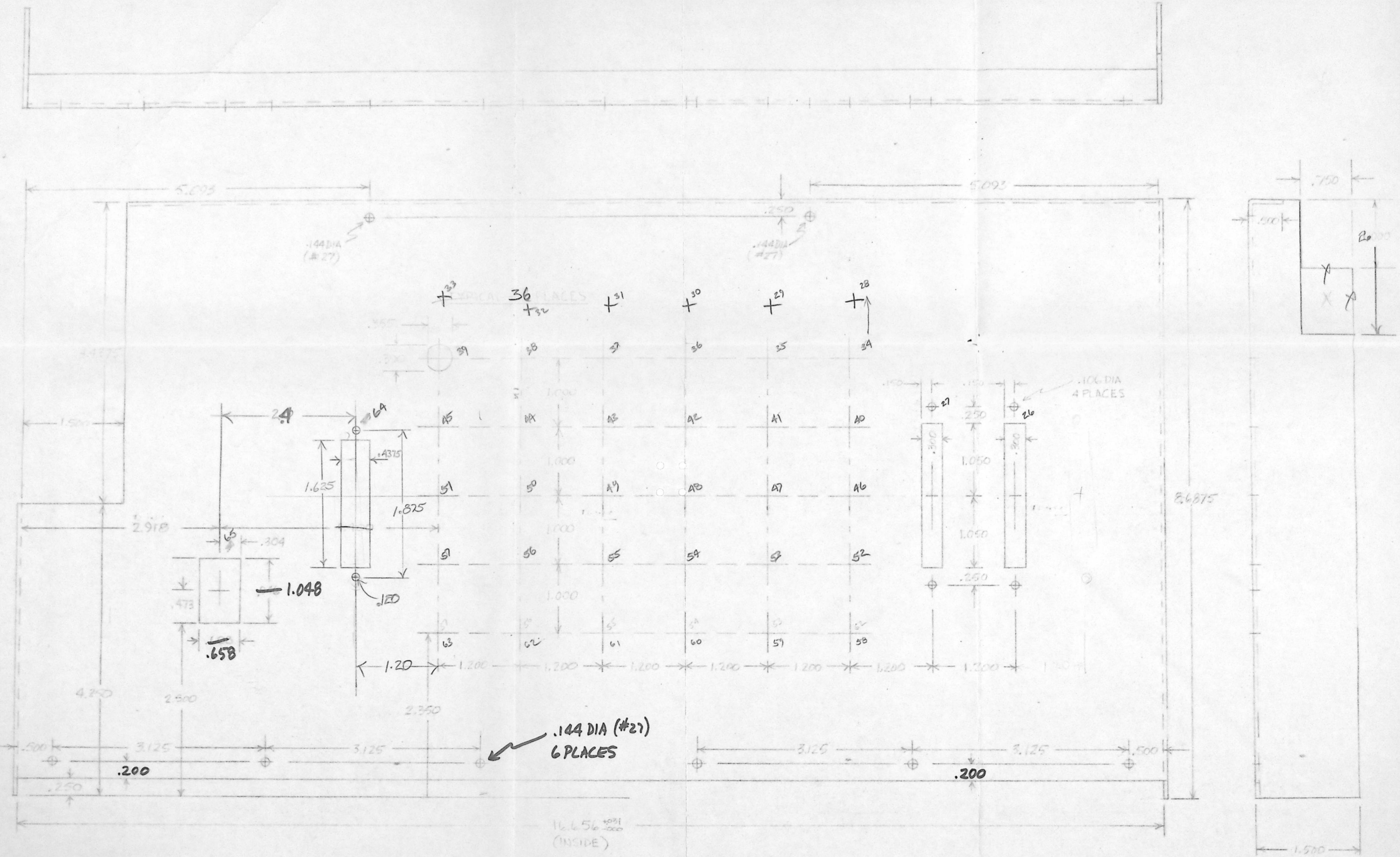
CI-00345



MATL — ATSM A 366 #1664.(.0478) CRS

REAR PANEL, RPU #1

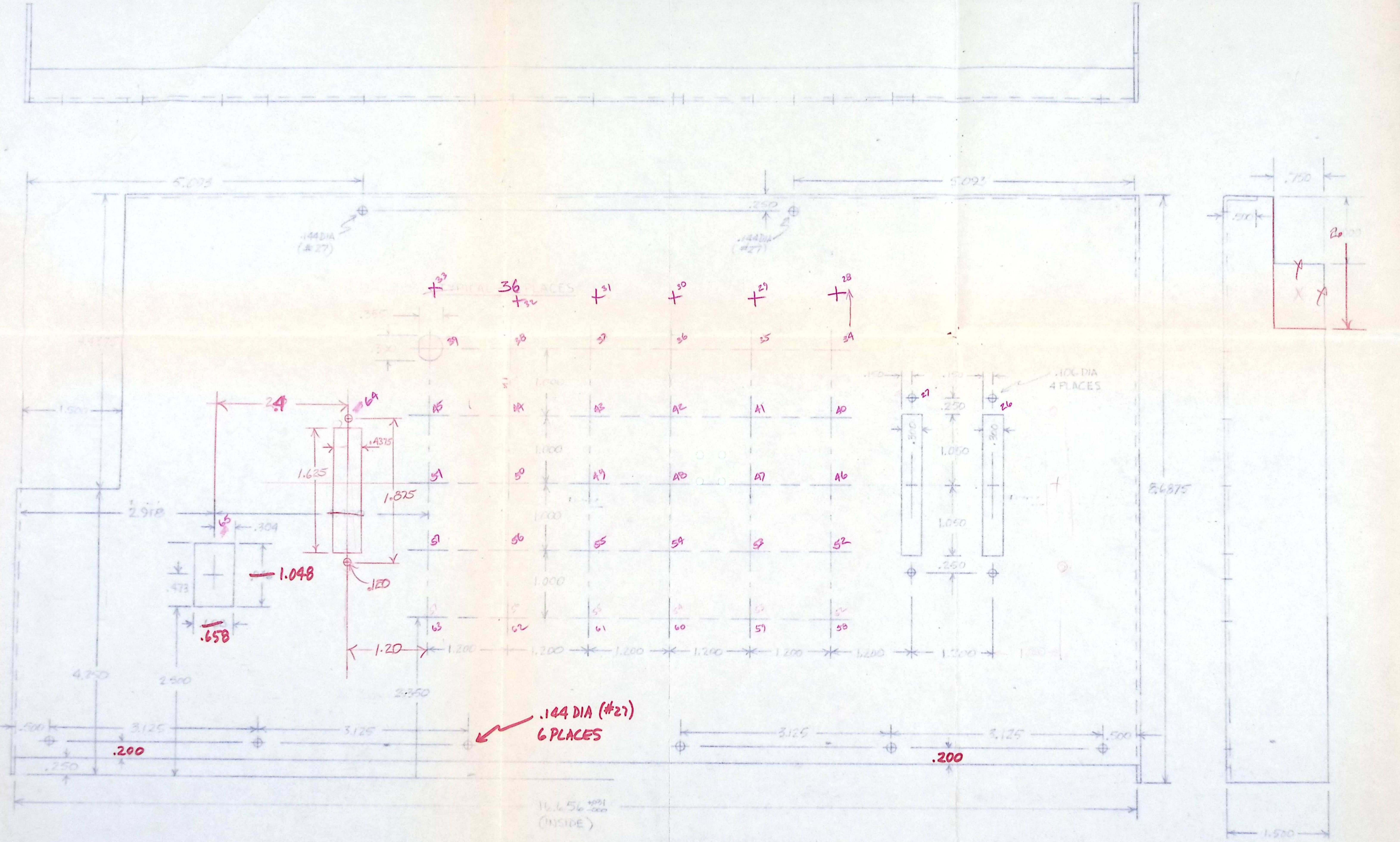
CI-00345



MATL – ATSM A 366 #18GA (.0478) CRS

REAR PANEL, RPU #2

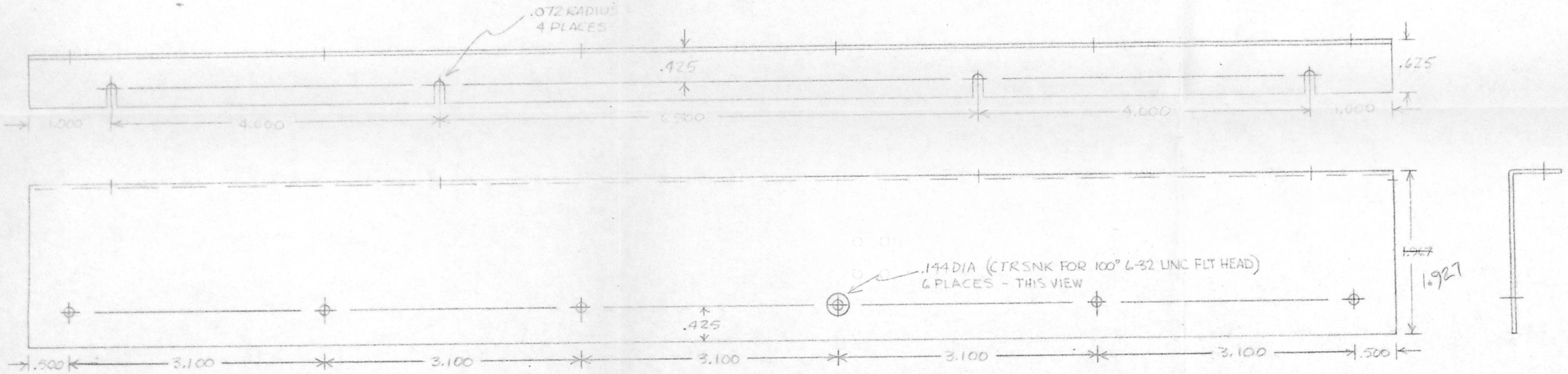
CI-00346



MATL — ATSM A 366 #18GA (.0478) CRS

REAR PANEL, RPU #2

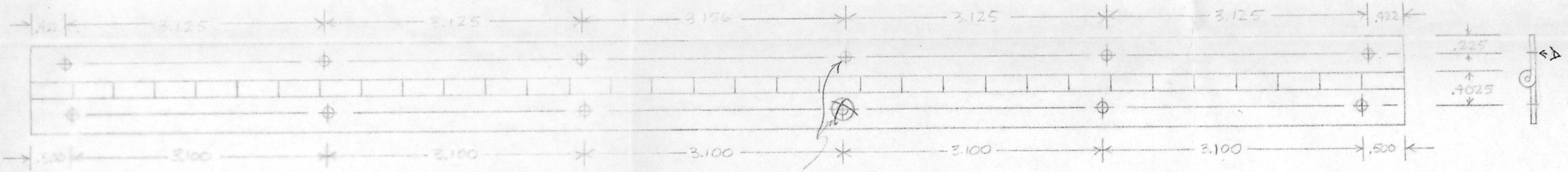
CI-00346



MATL - ATSM A 366 #GA (.0478) CRS

REAR PANEL MTG BRACKET

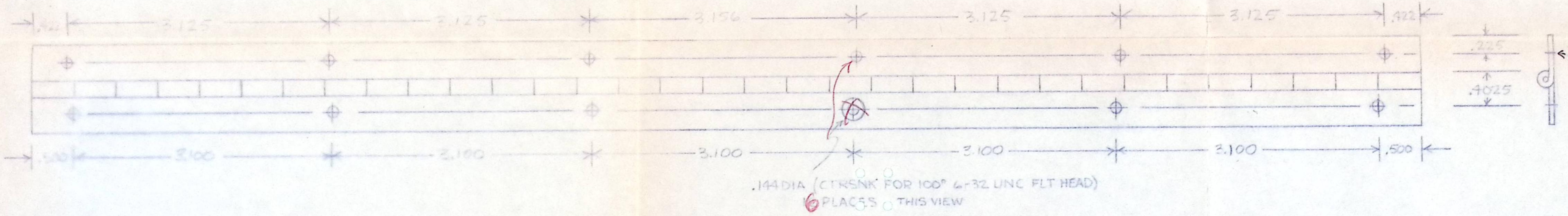
CI-00348



.144 DIA (CTRSNK FOR 100° 6-32 UNC FLT HEAD)
6 PLACES - THIS VIEW

PIANO HINGE, MODIFIED
REAR PANEL RPU #1, RPU #2, &
FUNCTION GENERATOR

CI-00349



PIANO HINGE, MODIFIED
REAR PANEL RPU #1, RPU #2, &
FUNCTION GENERATOR

CI-00349